LINUX MINT 18 Cinnamon set up for daily use

PLEASE READ CAREFULLY BEFORE PROCEEDING: Charles Phillip McDougall of Theodore, Qld, Australia, being a comparative newcomer to Linux Mint, makes this eBook free of charge to anyone, the use of which must be on the clear understanding that there shall be no liability whatsoever to either myself or to my family or to anyone else at any time. If you proceed in any way with the information contained herein, it shall be completely at your own risk. The original purpose of this eBook was to make the re-installation of Linux Mint faster and simpler, should there have been a need to do so, but its' added purpose now is to share it with others. As this is **not** an in-depth document, it may, however, satisfy the curiosity of some newcomers to Linux Mint. Please study Linux Mint's User Guide in the PDF format, available on the '*Linux Mint 18 Sarah Welcome Screen*', under 'Documentation', before proceeding further.

INTRODUCTION:
The cost of upgrading commercial operating systems and their software suggested it was time to consider other alternatives. As there was no shortage of Linux Systems available, and as most of them were free together with most of their software, it seemed as good a place to start as any. After testing a number of these systems, as well as viewing the opinions of numerous persons on the Internet about them, the decision was arrived at to go with Linux Mint 17 Cinnamon. At a later date **Linux Mint 18 'Sarah' Cinnamon** was installed (in both 32-bit and 64-bit), and it appeared to be as user friendly as the previous version. Linux Mint has proved to be an outstanding operating system. Nevertheless, as in all things, the users must make up their own minds. This eBook has been designed with the beginner in mind, and has included as many questions and answers as time has allowed.

ACKNOWLEDGEMENTS:
Appreciation is extended to the many experimenters and experts of the Linux Mint system who posted their ideas on the Internet free of charge, without which this book could not have been written.

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SYSTEMD: Linux Mint 18 is based on Ubuntu 16.04, which uses **Systemd**. A number of other popular Linux Systems have also opted to go with Systemd. The previous versions of Mint used the 'SysV init' system, the job of which was to initialize the system, and load the correct drivers upon system boot, etc. A web search will show the tasks performed by these systems. Fortunately, Linux Mint 18 runs on a number of old, as well as most new computers.

Linux Mint 18 Sarah Cinnamon 32-bit works well on a variety of old computers. The 64-bit version suits many of the newer computers, and will be the choice of the future, as an increasing number of web browsers may stop supporting 32-bit systems. Google Chrome is one such. Read more on this under the heading 'BROWSERS'.

LTS: LTS stands for 'Long Term Support'. The following systems will be supported until 2021:
Linux Mint 18 'Sarah' Cinnamon LTS 32-bit and 64-bit systems (issued about 30th June 2016).
Linux Mint 18 'Sarah' Mate LTS 32-bit and 64-bit systems.
Linux Mint 18 'Sarah' Xfce LTS 32-bit and 64-bit systems.

END OF SUPPORT: When 'End of Support' is reached, we will no longer receive updates for security issues on our installed software, whether it be for the OS or the programs we use. This includes the Web Browser/s, which is/are essential for Online Banking (see USING A LIVE CD FOR SAFER BROWSING at the end of this eBook). As Linux Mint 18 is supported until 2021, we will receive updates for any security issues until then, which means we will not need to upgrade (to 18.1, 18.2 etc) each six months or so, if we do not wish to.

DOES LINUX SUIT EVERYONE: The answer is no. Though Linux is very easy to navigate once we learn how to, it still takes time to gain that knowledge. In our case, it has done everything we had previously done on commercial systems for the past fifteen years except scan, as our scanner was not the correct one. There is more on scanners further on. However, some things are faster and some things are slower, as would be expected.

For those wishing to try it, it may be best not to dual-boot it with commercial operating systems so as to avoid conflicts, but rather to run it on another computer as a single install. This will allow time to get used to it. The software is free to date (except for any software external to Linux Mint), and to date our computer has not been troubled by viruses. With a few or more clicks, any software that requires updating can be updated.

After installing Linux Mint 18, plus '**SOME ESSENTIAL EXTRAS**' listed further on, the following worked well: **CD/DVD/ISO** burning. **Claws Mail**. **DjVu** eBook readers. **ePub** eBookreaders. **FLV** movies. **Gmail**. **JPG's**. Presentations for slide shows (**LibreOffice Impress**). A document program (**LibreOffice Write**r). **Movies**. **MP3**. **MP4**. **Mpeg**. **PDF**. **Sylpheed** (eMail). **Web Browsing**. **Printing** (see Printers further on). **Text**. **YouTube** video downloads using the Terminal as shown further on. Free **AntiVirus** and **Firewall** are also available. Free **business software**, etc. Once installed, all went well. And, like commercial systems, this is only the start of what can be done.

LINUX MINT HACKED:
The official Linux Mint Website was hacked on the 20th February 2016, with only the 'Linux Mint 17.3 Cinnamon ISO' being compromised. If the ISO was downloaded via torrents or a direct HTTP link, there was no problem. ISO's prior to, and after this date are OK. The links to the compromised ISO were removed the same day. Instead of reinstalling, we could upgrade the system by pasting the following into the Terminal: **sudo apt-get update && sudo apt-get upgrade**. However, as upgrading the system may suit some, it might not satisfy others, as a few errors could carry over to the new system. I have opted to do a fresh install with Linux Mint 18. for further details about the hack, copy and paste **http://backdoored-linux-mint-and-the-perils-of-checksums** into the search engine.

SHOULD WE PURCHASE AN INSTALLATION DVD: It can sometimes be best to purchase a DVD with the free Linux Operating System of our choice already installed on it. This saves us from having to go through the various steps to confirm that the ISO we freely downloaded has not been tampered with, and that its' transfer to DVD is also completed without errors. Should we prefer to purchase Linux Mint 18 already installed on DVD, then the recommended website to purchase it from is **OSDisc.com**.

THE LINUX MINT 18 ISO: If we prefer to create our own DVD, then the ISO in either 32-bit or 64-bit can be downloaded from the Linux Mint Homepage, which can later be burnt to DVD as an active ISO, but only after making the usual checks. The download page for the ISO is: **https://www.linuxmint.com/download_all.php**.

CHECKING THE SHA256SUM OF THE DOWNLOADED ISO: (before burning it to a DVD). After downloading the ISO (from the recommended site), copy and paste it to the Desktop or the Home Folder, as this can make it easier to check. Right-click on the ISO, then click on '**Check SHA256**'. After a while a tiny box with a mixed set of 64 letters and numbers appears. This is the sha256sum. If this sha256sum is different to the matching one listed below, then delete that downloaded ISO, as it has either been interfered with, or it was corrupted during download. If the sha256sum is correct, the ISO can then be burnt to DVD, after which the DVD should go through an accuracy check.

Another way to check the sha256sum of the downloaded ISO: Copy the downloaded ISO to the Home Folder. If it is 64-bit, paste sha256sum linuxmint-18-cinnamon-64bit.iso to the Terminal and then click 'Enter' (change 64 to 32 for a 32-bit ISO). The Terminal result for **64-bit** should be: 2238dca5b51f9e2674a7e31c46f19141fbdecff6e44c06ecbc9a7bb59b75a816 linuxmint-18-cinnamon-64bit.iso, as also shown below.

Verification information is available at: **https://linuxmint.com/verify.php**

Further information is available by copying and pasting **blog.linuxmint.com/?p=3051** into the search engine. Once on that page, scan down to the end of the listed countries, then click on 'sha256sum.txt'. After completing the check, do the same for 'sha256sum.txt.gpg' to get its' data (Pgp stands for 'Pretty Good Privacy', and gpg stands for 'GNU privacy Guard').

sha256sum.txt, e.g. (the sha256sums as shown below were confirmed on two different sites)

3fb60a7698f5d80e68526016da3e4455d8a19be6b1cb0eeb5b59dbdd8cf1ffb3 *linuxmint-18-cinnamon-32bit.iso

2238dca5b51f9e2674a7e31c46f19141fbdecff6e44c06ecbc9a7bb59b75a816 *linuxmint-18-cinnamon-64bit.iso

ff8bacc631e7955fc6b0f86c9014ce27aa455e3ee0913de0b2bc6c366b63c693 *linuxmint-18-kde-32bit.iso

87d834c13fb3e03a9c1111a9f3cec50a65c05d36247bfb6c36442c2d8a2b2484 *linuxmint-18-kde-64bit.iso

d064397cd185fa4a91fd6db4ff42f105c121a76076917973253231357l3a8810 *linuxmint-18-mate-32bit.iso

c634f48b248489eef782067484a04978f046e9ccd507d9df35c798a1db9bef22 *linuxmint-18-mate-64bit.iso

9f3a4040181dcfbc027910ead361dbaf7cc3e90949ebeac0722c7e7d55fda837 *linuxmint-18-xfce-32bit.iso

2151852abb34bd62350fab807acc04b3f337d928c7c8092aebea7d0524587acf *linuxmint-18-xfce-64bit.iso

sha256sum.txt.gpg. It is best to go online to get this sum oneself, to confirm its' current status.

BURNING THE DOWNLOADED ISO IMAGE TO DVD:
If the **sha256sum** is correct, the ISO file can then be burnt to DVD using an ISO burner on either a Linux or a Windows OS. Do not use a burner that simply copies files, as it must be able to burn active ISO's. The first time I used 'Free ISO Burner Portable' on our Windows OS (as we only had Windows then), though InfraRecorder was recommended for a Windows OS. If burning the image in Linux Mint, insert the blank DVD and cancel the pop-up box. Right-click on the previously downloaded ISO, click 'Open With', and select 'Brasero' (recommended) or '**Xfburn**'. If using Xfburn, then, after the 'Burn image' box opens, select '4' speed as the burning rate (slow), and 'Auto' as the 'Write Mode'. Under 'Options', select 'Eject disk' and 'BurnFree' by clicking an 'x' beside them. Now click 'Burn Image'. The ISO image will then be burnt to the DVD as an **Active** ISO Image.

PERFORMING THE INTEGRITY CHECK ON THE DVD: This is performed after the live DVD has been created to confirm that the DVD is OK. To begin: Start the computer, insert the live DVD, then turn the computer off. **Alternatively, carefully push a straightened paper clip into the tiny hole at the front of the CD/DVD player while the computer is turned off, so as to open the DVD Drive to insert the DVD**. Click the computer's 'Start' button then rapidly press, e.g., F12, until the option to boot from the DVD appears, then select that option. The 'Welcome to Linux Mint 18 Cinnamon' screen appears. It has five options. They are: **1** Start Linux Mint. **2** Start in

compatibility mode. **3** Integrity check. **4** Memory test. **5** Boot from local drive. Click on '**Integrity check**' to highlight it, then press 'Enter' on the keyboard. The following message soon appears: 'Checking integrity, this may take some time'. Further checks appear, the slowest of which is 'Checking./casper/filesystem.squashfs'. When the slow check completes, a few rapid checks complete, after which the following message appears if all is OK: '**Check finished: no errors found**'. A further message says 'Press any key to reboot your system'. If the DVD is OK, it can be used when we are ready to install Linux Mint on the computer of our choice.

LINUX MINT 18 ON OLD COMPUTERS: I decided to install and test '**Linux Mint 18 'Sarah' Cinnamon (32-bit)**' on an old Dell OptiPlex 780 computer, with Core 2 Duo, 3GHz, and 4GB RAM. It worked quite fast with all the 32-bit software listed in this document. It also ran Windows XP in RoboLinux VirtualBox easily and without problems. However, it would not run the **64-bit** version of Linux Mint 18 due to its' hardware incompatibility, which was later successfully installed on a newer computer (since the first of March 2016 Google Chrome requires a 64-bit computer system to run on).

CAN WE DUAL BOOT WINDOWS AND LINUX MINT: Yes, but I chose **not** to dual-boot, as a matter of personal choice. You might do otherwise. As Linux and Windows operating systems use different file systems, e.g., **ntfs** for Windows and **ext4** etc for Linux, conflicts can result. Linux is often removed when installed beside Windows as dual-boot. On the other hand, many run dual-booting on their computers without any problems. For those who have a spare computer in the cupboard, it might be useful to install Linux Mint on it to see if it is suitable for one's needs.

Most computers with a Windows 8 logo sticker on them have Secure Boot enabled by default. This means it may have to be disabled, if you decide to dual boot Linux Mint with Windows 8. This does not apply if we install Linux Mint as the only system on the computer.

CAN WE CHECK OUT LINUX MINT BEFORE INSTALLING IT: Yes we can. First connect the Internet lead to the computer in case we decide to install it after checking it out. Now turn on the computer, insert the Linux Mint 18 DVD, and then turn off the computer. Next press the computer's start button, and immediately press F12 on the keyboard fast and often until the option to boot from the DVD appears (in some cases F12 should not be pressed until the first flicker of light appears on the screen). Select that boot option, then follow the prompts. After a while the Linux Mint Desktop appears, so we can then navigate through it to see if it suits us. If it does, then the already connected Internet cable will allow for file updating whilst installing. If installing, read whether or not to select an important option next. **Continued next**:

AN OPTION WHILST INSTALLING LINUX MINT 18:
Continued: If we decide to install Linux Mint after navigating through it, then double click the round DVD icon on the previously mentioned screen to start the installation process. The 'Welcome (English)' screen appears. Click 'Next'. The 'Preparing to install Linux Mint' screen appears. We can include an important option by clicking in the tiny box beside 'Install third-party software for graphics and Wi-Fi hardware, Flash, MP3, and other media. This software is subject to License terms included with it's documentation. Some is Proprietary'. After installing both ways, it was found that some software did not work if that option was not included. From this point on, follow the prompts. If we choose not to select this option, then it can be installed after Linux Mint is installed and updated. How to include it afterwards is shown under the heading '**How to install Media Codecs after installation**', listed a bit further on.

RESTART THE COMPUTER AFTER INSTALLATION: The first thing to do after installing Linux Mint 18 is to restart the computer.

RUN THE 'UPDATE MANAGER' AFTER RESTARTING: Now that the computer has been restarted, it is time to fully update the system. Before proceeding, read the section below in red. Updating the system is a simple process as follows: Click on the tiny shield on the panel, located on the bottom-right-side of the Desktop. When the Update Manager screen appears, click 'Install Updates' at the top of that screen, enter the password (the password is the same as the one we chose whilst installing the system), and then press 'Enter. This first updating can take quite a while. Once the updating is completed, the computer should be restarted once again **to apply the updates**.

Each day keep an eye on the tiny Update Manager shield on the bottom Panel. Whilever a 'tick' is visible within the shield, then no updating is required. If an 'l' or something else appears within the shield, then updating is required.

In the 'Level' section of the 'Update Manager' screen, we can view the safety levels of any updates that may be ready to be installed. 1-3 is considered stable and safe. 4-5 is considered unstable and risky, so are usually not marked for installation by default. Linus Mint 18 is based on Ubuntu 16.04, and Ubuntu is said to install all of their updates by default. To get more on this, go to '**How-To Geek**' and see what they say. It is worth reading: **http://www.howtogeek.com/**. Once the website opens, click on 'Search' near the top right side of that page, and then type the following into the window: 'Ubuntu Developers Say Linux Mint is Insecure. Are They Right?' Either way, some say there are few problems, or, put another way, there can be problems no matter which way we go. I install almost all '4' and '5' level updates, leaving out the ones that look risky, and have never had any problems doing this. The only way a virus can infect Linux Mint is by giving permission for them (viruses) to install on the system, so be careful, not only here, but during other actions also.

Instead of using the Update Manager, we can paste '**sudo apt-get update**' into the the Terminal to update the system, though for every day updating **it is not recommended** to go this way. The use of sudo should be limited to where it is required.

HOW TO INSTALL MEDIA CODECS AFTER INSTALLATION: Continued from a previous heading 'An option whilst installing Linux Mint 18': If we did not choose that option whilst we were installing Linux Mint 18, then we can install the multimedia codecs now as follows: Paste **sudo apt-get install mint-meta-codecs** into the Terminal, then follow the prompts.

SECURITY SOFTWARE: Now that we have just installed and updated Linux Mint, it is time to install some security software. The security software information appears further on in this document under the headings: '**Firewall'**, **'Do we need Antivirus or Rootkit Removers'**, **'Antivirus'**, **'ChkRootKit'**, **'RKHunter'**, and **'Nemiver'**. We may or may not wish to apply the Firewall rules listed, e.g. the sudo ufw deny/allow rules listed under 'Firewall', though I chose to do so. However, it is necessary to activate the firewall. As Linux Mint has no central registry (though it does have a registry made up of simple text files), it seems to run more free of problems than computers with non-Linux Systems. It is nevertheless wise to install an Antivirus and Firewall at least, not only for its own security, but so we not to infect another persons' commercial computer when sending emails. The other side to this is that some people have run Linux Mint with no Firewall or Anti-virus installed for years, and say they have never had any problems, though this is risky.

It is said there were about fifty malware that were known to run in Linux in 2014. However, before it can do so, we must first give it 'root' permission to install on the system. So be careful not to carelessly install anything and everything. If we are very careful, it could be said that an AntiVirus may not be necessary, but it pays to be safe. Having said this, I installed 'WINE' with 'PlayOnLinux', listed under '**WINE. INSTALLING WINE WITH PlayOnLinux**' further on, which is used to run some Windows compatible software within Linux. There is said to be some risk of

infection doing this, though there have been no problems on our computers so far. Be careful of the choice of software to run in WINE.

Malware that is designed for Windows operating systems will not execute in Linux systems, as Linux has a different file system to Windows (ext4 for Linux), as opposed to ntfs (for Windows). However, if not protected, Linux can still harbour this malware to be sent elsewhere.

UPDATE MANAGER ERROR MESSAGES:
When Google Chrome stopped support for all 32-bit systems in March of 2016, I uninstalled it from our 32-bit computer. After removing it, and whilst updating the system afterwards using the Update Manager, the following error message appeared: *"Could not refresh the list of updates. W:failed to fetch* **http://dl.google.com/linux/chrome/*deb/dists/stable/Releas****e. Unable to find expected entry 'main/binary-i386/Packages' in Release file. (Wrong sources.list entry or malformed file). Some index files failed to download. They have been ignored, or old ones used instead"**.

There are different ways to uninstall software. It can be done using the 'Software Manager' etc. As for Google Chrome, the correct way to uninstall it is with the 'Synaptic Package Manager', as it leaves no traces. It was the traces that left the 'error' message listed above. These 'traces' were later removed using the above mentioned SPM, which in turn removed any 'error' messages.

SYNAPTIC PACKAGE MANAGER:
To uninstall, e.g. Google Chrome from 32-bit (or 64-bit systems):
1. Open the 'Synaptic Package Manager'.
2. Click the 'Search' Icon near the middle top.
3. Type 'Google Chrome' into the 'Search' window, then click 'Search'.
4. Right click on 'google-chrome-stable', then click on 'Mark for complete removal'.
5. Click 'Apply' near the top left. Now follow the prompts.

Use this uninstall method when a similar message appears: "Could not refresh the list of updates. W:failed to fetch…" as previously mentioned.

PACKAGES:
The free software packages for Linux Mint have been quoted to number about 45,000 or so. Our software choices are made up of packages, so whenever we download software from the Software Manager, we are downloading packages. It usually takes more than one package to install a program, so packages can then be shared between other programs, thus reducing the total amount of disk space used.

The Software Manager can be accessed by clicking 'Menu' (bottom left), then clicking 'Software Manager' (second on the top-left-side of the pop-up). Now enter the password in another pop-up, and click 'Enter'. The Software Manager shortly appears with its' various categories of software listed in twelve boxes.

EXTERNAL SPEAKERS: We might have to make some adjustments to the Sound settings. To do so, click 'Menu', then 'Preferences', and then 'Sound'. Click on the listing of choice to set the speaker volume. The 'Sound' window can also be accessed by clicking on the speaker Icon on the Panel at the bottom right side, then clicking on 'Sound Settings'. Also check that the volume control on the plug-in speakers is set neither too low nor too high to suit our particular computer.

INSTALLING THE NEXT UPGRADE WHEN AVAILABLE: It is probably best not to upgrade from Linux Mint 17.3 to Linux Mint 18, as some conflicts might carry over. A fresh install is an excellent option. This is, however, a matter of opinion. Once having freshly installed Linux Mint

18, there should be no problems when upgrading to 18.1, 18.2, etc.

One way to upgrade is to paste **sudo apt-get upgrade** into the Terminal, press 'Enter', then follow the prompts. This is not the recommended way.

The **recommended** way is to open the **Update Manager** (the tiny shield on the bottom panel), click '**edit**' at the top of the Update Manager window, then click '**Upgrade to Linux Mint 18**x' if an upgrade is available. If it is not available, then that option will not appear. There is a difference between an update and an upgrade. An upgrade overwrites the existing system, so we might lose some system settings. Should this happen, we can easily reset them. I have upgraded a few times, from, e.g. 17 to 17.1, 17.1 to 17.2, and 17.2 to 17.3, without any mishaps.

WALLPAPER: Each version of Linux Mint has its own wallpaper. So, when ready, we can select the pre-installed Desktop Wallpaper, by clicking on 'Menu', 'Preferences', then 'Backgrounds'. Alternatively, copy and paste our preferred JPG's in the ‘Pictures’ folder located in the ‘Home’ folder. To get all previous issues of wallpaper, paste **sudo apt-get install mint-backgrounds-*** into the Terminal, then click 'Enter'.

The easy way to select the wallpaper of our choice is as follows: Right-click on the Desktop, click ‘Change Desktop Background’, then click once on the wallpaper of our choice. If we pasted the previous command into the Terminal, we would already have the wallpaper from the following Linux Mint versions: ‘Maya’, ‘Nadia’, ‘Olivia’, ‘Petra’, ‘Qiana’, ‘Rafaela’, ‘Rebecca’, ‘Rosa’, ‘Sarah’, ‘Retro’, and of course ‘Pictures’ (our own jpg’s). Click once on each of these in turn, until we find our preferred Desktop image.

APPLETS TO ADD OR DELETE: To add an applet, right-click on any empty space on the Panel (located at the bottom of the Desktop), then left-click '+ **Add applets to the panel**' from the pop-up. Next, right-click on the Icon we wish to add, then click 'Add to Panel'. If we want to remove the Icon (applet) from the Panel instead, click ‘Remove from panel’.

SUDO: We should **not** use sudo to install ordinary applications, as unnecessary use of it can mess up our files. If we use it to launch an ordinary application, it creates files and directories that are the property of 'root', and not of us. It also changes ownership of some existing files to 'root'. Use the Software Manager whenever possible, as it is the central file installer for the system, and infections will be very, very difficult to enter the system this way.

.DEB FILES: Avoid the overuse of .deb files where possible, as problems might occur. However, there are some programs that require it.

DECREASING THE SWAP USE: **Decreasing the Swap Use may be RISKY to the System, but this is simply my opinion**.

THE COMPUTER MONITOR: If installing Linux Mint on our own computer, it will adjust itself to the size of the monitor used whilst installing it. If installing Linux Mint for someone else whilst using our monitor, they may have to adjust their monitor's screen resolution when they take their computer home, otherwise the Desktop may over or under-fill’ the screen. To reset it: Click 'Menu', 'Preferences', and then 'Display'. The monitor's resolution can now be set for correct viewing. The correct resolution might be 1024x768 (4:3), or 1152x864 (4:3), or 1280x1024 (5:4), and so on. When the correct resolution is selected, then the screen will fill correctly.

It may be useful to place the 'Display' icon in an accessible location on their Desktop. This can be done as follows: Click 'Menu', then 'Preferences', then right-click on 'Display'. From the pop-down

box, left-click on 'Add to Desktop'. They can then set the screen's 'Resolution' more easily at home, should the monitor overfill.

RESTORING LINUX MINT'S DEFAULT SETTINGS: (if necessary)
1. Right-click on 'Menu'. A small box appears with 'About...', 'Configure...' and 'Remove this applet'.
2. Click on 'Configure...'. The 'Applets' screen appears.
3. Click the tiny 'More actions...' button. It is located at the right side of the 'Remove' button.
4. From the drop-box, click 'Reset to defaults'.

CD / DVD BURNING SOFTWARE:
The following work on the Cinnamon Desktop. There are also others.
'**Brasero**' (for the Cinnamon Desktop) burns data etc and **ISO**'s to CD and DVD.
'**K3b**' (for KDE Desktop) handles Blu-ray burning. It also burns audio and video to CD and DVD.
'**Xfburn**' (for xfce Desktop) burns data etc and **ISO**'s to CD and DVD.
'**Nero for Linux**' is available, but is **not free**.
'**ImgBurn**' is **free** software that runs in Windows operating systems. It also runs well in WINE, and is a lightweight CD, DVD, HD DVD and Blu-ray burning application.

When inserting either a CD or DVD to burn to, a message appears: 'You have just inserted a blank CD / DVD. Choose which application to launch, then follow the prompts'. Cancel this window, open the burner of choice, and then follow the prompts. The first three program icons can be located as follows: Click 'Menu', 'Sound & Video'. The ImgBurn Icon can be located in the 'Menu, 'Wine' section. They are easy to use.

SYSTEM FREEZES: If we press Ctrl+ALT+Delete, we can log out of the system under normal conditions. However, if the system freezes, we can press Ctrl+Alt+Backspace to return us to the login screen without having to reboot the system. If these fail, some are said to unplug the computer from the power, and then restart.

PRINTERS: (**getting them recognized**)

1. Connect the printer to the computer and turn it (the printer) on. Make sure the internet is connected. Click 'Menu', then 'Administration', and then 'Printers'. The 'Printers - Localhost' box appears. If the printer is not automatically detected, proceed as follows:

2.In the 'Printers-localhost' window, click'+**Add**'. The 'New Printer' (Select Device) window opens. Click once on the printer's name to highlight it. On the right-side under 'Description', the following appears: 'A printer connected to a USB port'. If the printer connects via USB, then 'USB' will be highlighted near the bottom. Click '**Forward**' near the bottom right-side.

3.A new window appears named 'New Printer' (Choose Driver). Leave 'Gutenprint' highlighted, select 'Free Software' then click '**Forward**'. The small 'Installing driver openprinting-gutenprint' window appears with the following message: 'Installing...'. This may take a while.

4.The 'New Printer' (Choose Driver) window reopens. Click a dot beside 'Select printer from database', then click on the brand of choice. In our case I clicked on 'Canon (recommended)' to highlight it, and then clicked '**Forward**'. Another 'New Printer' (Choose Driver) window appears, which lists a lot of printer models. In our case I chose 'MP490 (recommended)' which was already highlighted, and then clicked '**Forward**'.

5.A 'New Printer' (Describe Printer) window shortly appears. It should have the printer's description in the first two tiny windows. The third tiny window might have something like

‘bill-All-Series’. Click ‘**Apply**’. A tiny box appears. A new window named ‘Would you like to print a test page?’ soon appears. If so, place paper in the printer then click ‘**Print Test Page**’. A small window then opens named ‘Submitted’, (Test page submitted as job 1). Once printed, click ‘OK’, then cancel out of the the window.

PRINTERS: **(continued)** Printer drivers are also available from the Software Manager. If we wish, we can type ‘printers’, then ‘printer drivers’, then 'ubuntu-drivers', each in their turn, into the ‘Software Manager’ search window, then manually install some the drivers we think we might need. We may **not** get the drivers we need this way though. Under '**printers**' in the Software Manager, there is 'printer-driver-cjet', plus some other drivers. Under '**printer drivers**' in the Software Manager, there is 'foomatic-db-gutenprint', 'printer-driver-all', 'printer-driver-all-enforce' (and 'Printer-driver-gutenprint' which should come installed). Under '**ubuntu-drivers**', there is 'ubuntu-drivers-common', etc. These drivers allow for some other printers to be recognized. However, none of this should be necessary if we follow the information in the previous section.

Once the printer is set up, it is not necessary to click on the ‘Printers’ Icon in order to print. The printer’s software window is simple, but is OK. For an HP Printer, install the ‘**HPLIP Toolbox**’ software, also available from the ‘Software Manager’ screen. It is said to be very good.

SCANNERS: Even though we can download free drivers for printers, it seems that the scanner manufacturers are not releasing many of their drivers for Linux systems. As our particular model of Canon scanner works on an old computer with a Windows OS, then it is not a problem for us.

A variety of drivers can be downloaded in the Software Manager. Under '**xsane**', there is 'xsane' and 'xsane-common'. Under '**hplip**', there is 'hplip-gui', 'hplip', 'hplip-doc', hplip-dbg', and 'hplip-data', which installs the HPLip Toolbox (said to be for printing and imaging).

HPLip stands for (Hewlett-Packard Linux **Imaging** & Printing). It is said to be able to print and scan on some HP inkjet and laser based printers. For a list of supported HP units, go to: **http://www.hplipopensource.com/hplip-web/supported_devices/index.html**. Either copy and paste this address into the search engine, or else hold down Ctrl while clicking on this link. As we do not have one of these HP units then you will have to do your own research.

Under '**scanners**' in the Software Manager there is 'sane-utils', 'libsane', 'libsane-common', 'libsane-dbg', 'libsane-dev', 'libsane-extras', 'libsane-extras-common', 'libsane-extras-dbg', 'libsane-extras-dev', etc. However, unless we have the correct driver for a particular scanner, then the scanner will not work.

To try and locate a compatible scanner for Linux Mint, go to 'SANE - Supported Devices'. Copy and paste **sane-project.meier-geinitz.de/sane-supported-devices.html** into the search engine. As previously stated, you will have to do your own research.

CAMERAS: Digital cameras are quickly identified, and choices on what to do with the images are available. The following can be downloaded from the Software Manager: 'UFRaw', 'ufraw-batch', and 'gimp-ufraw' imports raw data into the Gimp, etc.

WHAT OPENS SOME OF MY OLD FILES:

DjVu eBooks: 'Okular'. 'Document Viewer'. Also **install** ‘DjVuLibre DjView 4’.

Email Client: To open our old 'Outlook Express' and 'Windows Live Mail' emails, both of which have an .eml ending, i**nstall** 'Sylpheed', and/ or Claws Mail. How to install Sylpheed appears further on.

Epub eBooks: **Install** ‘FBReader' (e.g. ‘E-book Reader’), as well as 'E-Book Viewer'. 'E-Book

Viewer' installs with 'Calibre'. They both retain page location.
FLV movies: 'VLC media player', ‘Videos', e.g. 'Totem'. **Install** 'SMPlayer', ‘Gnome Mplayer'.
HTML files: 'Mozilla Firefox Web Browser'.
JPG: 'Image Viewer'. **Install** 'gthumb', 'Gwenview' and 'ImageMagick'.
MHTML files: **Install** 'Qupzilla'.
Mpeg 4: 'Videos', e.g. 'Totem', 'VLC media player'.
M.S. Word: 'LibreOffice Writer'. **Install** 'AbiWord' (it can be useful).
Mobipocket: **Install** ‘FBReader' (e.g. ‘E-book Reader’). It remembers page location.
Movies (some old **AVI** movie files from the Internet Archive): 'Videos', e.g. 'Totem'. **Install** 'Enqueue in SMPlayer', 'SMPlayer'.
Movies (The DVD VOB movie files): 'VLC Media Player', 'Videos', e.g. 'Totem'. After inserting the movie DVD, right-click on the tiny DVD Icon that appears on the Desktop, click ‘Open with’, then click on either ‘VLC media player’, or ‘Videos’ (e.g. 'Totem').
MP3: VLC media player. **Install** 'Rythumbox', and 'Audacious'. ('1by1' is Freeware that runs on Windows OS, and is very good, but must be installed in 'Wine'. Also, its' sound level is a bit lower than some other Linux players).
MP4: (also including old mp4’s from the Internet Archive): ‘Videos’ e.g. 'Totem'. **Install** ‘SMPlayer’. Both work well.
PDF (for viewing): ‘Document Viewer’. **Install** 'Okular'.
PDF (to print to PDF): 'LibreOffice Writer' (e.g. ‘Export as PDF’)
Powerpoint: 'LibreOffice Impress'.
Read documents aloud: **Install** 'Gespeaker'. It works ok. Also 'eSpeak speech synthesizer' e.g 'espeak-gui'.
Text: Gedit (e.g. Text Editor). **Install** 'medit', and 'Kwrite'. 'Notepad' installs with WINE.
Windows software: **Install** ‘*PlayOnLinux*’, as it can install software made to run on Windows OS, but the space used to install them (in PlayOnLinux) is sometimes excessive. When we install PlayOnLinux, WINE is automatically installed (e.g. **W**ine **I**s **N**ot an **E**mulator). PlayOnLinux is a front-end for WINE. Wine runs some Windows software within Linux, and the space used to install programs in WINE is not excessive. A limited list of software that runs in Windows operating systems, and that also runs in WINE, appears further on. How to install PlayOnLinux can be located elsewhere in this document under ‘**WINE. INSTALLING WINE WITH PlayOnLinux**’.

THE TERMINAL: To open the Terminal, click 'Menu', then 'Terminal' from the pop-up box on the left. It is also located on the Panel (at the bottom) for faster access. The following are only a very few of the Terminal commands available. There are some more scattered elsewhere in this document.

Linux Mint have a handy list of Terminal Commands. To view and navigate that list, copy and paste **https://community.linuxmint.com/tutorial/view/244** into the Web’s search engine.

inxi -Fxz (or **inxi -Fx**)supplies data about the computer's hardware, etc.
lscpu supplies data about the cpu.
sudo lshw -short supplies data on the cpu, memory, and more.
lspci supplies data on the pci buses, etc.
lsblk supplies data on all block devices, being the hard drive partitions, etc.
df -H supplies data re partitions, their mount points, and their available space.
free -m supplies data on the amount of free and used ram.
sudo dmidecode -t processor supplies data on the processor.
sudo dmidecode -t memory supplies data on the ram.
sudo dmidecode -t bios supplies data on the bios.
cat /proc/cpuinfo supplies data on the cpu.

cat /proc/meminfo supplies data on the ram.
cat /proc/version supplies data on the kernel.
cat /proc/scsi/scsi supplies data on the scsi/sata devices.
cat /proc/partitions supplies data on partitions.
sudo hdparm -i /dev/sda supplies data on data devices.

THESE COME WITH THE INSTALLATION DVD: Do not delete any that come with the installation DVD. (There are about **93-items** listed below).
Accessibility.
Account details.
Applets.
Archive Manager.
Backgrounds.
Backup Tool.
Banshee.
Bluetooth.
Brasero.
Calculator.
Character Map.
Color.
Date & Time.
Desklets.
Desktop.
Desktop Sharing.
Disk Usage Analyser.
Disks.
Display.
Document Viewer.
Domain Blocker.
Driver Manager.
Effects.
Extensions.
Files.
Firefox Web Browser.
Firewall Configuration (e.g. gufw).
Font Viewer.
Fonts.
GDebi Package Installer.
General.
GIMP Image Editor.
Graphics Tablet.
Help.
HexChat.
Hot Corners.
Image Viewer.
Input method.
Keyboard.
Languages.
LibreOffice.
LibreOffice Base.
LibreOffice Calc.
LibreOffice Draw.

LibreOffice Impress.
LibreOffice Math.
LibreOffice Writer.
Log File Viewer.
Login Window.
Mouse and Touchpad.
Network.
Network Connections.
New Login.
Notifications.
Panel.
Passwords and Keys.
Pidgin Internet Messenger.
Pix.
Power Management.
Power Statistics.
Preferred Applications.
Printers.
Privacy.
Screen Reader.
Screensaver.
Screenshot.
Simple Scan.
Software Manager.
Software Sources.
Sound.
Startup Applications.
Synaptic Package Manager.
System Info.
System Log.
System Monitor.
System Settings.
Terminal.
Text Editor.
Themes.
Thunderbird Mail (e.g. Mozilla Thunderbird).
Tomboy Notes.
Transmission.
Update Manager.
Upload Manager.
USB Image Writer.
USB Stick Formatter.
Users and Groups.
Videos (e.g. Totem).
VLC media player.
Welcome Screen.
Window Tiling.
Windows.
Workspaces.

A FEW ESSENTIAL EXTRAS: Listed below are some programs that could be considered to be essential extras. It is said there are about 45,000 free packages available from the Software

Manager, though it usually takes more than one package to make one stand-alone program. The software's download name may occasionally differ from its' installed name. This can make some software difficult to locate. Where possible, both names have been added to make the software easier to locate in the Software Manager. To install any or all of the following: Click 'Menu', then the 'Software Manager' Icon (second from the top on the left. Enter the 'Password' then wait for the 'Software Manager' box to open. 'Type' the name of the software we want into the tiny search window, press 'Enter', then follow the prompts. Make sure the correct software is installed to suit either the 32-bit system or the 64-bit system. (There are about **51-items** listed below)

Abiword. (a Word Processor). Also:
abiword-common
abiword-plugin-grammar
abiword-plugin-mathview
APTonCD. (installation disc creator for packages downloaded via apt)
Artha. (a handy off-line thesaurus based on WordNet)
Audacity. (a fast cross-platform audio editor). Also:
audacity-data
Calibre. (an E-book converter and Library Management). It supports MOBI, LIT, PRC, EPUB, ODT, HTML, CBR, CBZ, RTF, TXT, PDF and LRS.
Calligra. (an extensive productivity and creative suite). It may require a restart after installing it.
Chkrootkit. (a rootkits detector). See '**CHKROOTKIT**' elsewhere in this document, to install it in the Terminal.
Chromium Web Browser. (an open source version of chrome)
Clamav. (an AntiVirus program). Also:
clamav-base
ClamAV-daemon
ClamAV-freshclam
clamav-docs
Clamtk. (a graphical front-end for Clamav)
Claws Mail, e.g. claws-mail. (a fast, lightweight and user-friendly gtk+2 based email client). It is similar to Sylpheed. We can also install:
claws-mail-pgpmime. (a pgp/mime plugin for claws mail)
claws-mail-acpi-notifier. (laptop's mail led control for claw's mail)
claws-mail-address-keeper. (an address keeper plugin for claws mail)
claws-mail-archiver-plugin. (an archiver plugin for claws mail)
claws-mail-attach-warner. (missing attachment warnings for claws mail)
DjView4. (a viewer for the DjVu image format). Also:
djvulibre-bin. (a viewer for the DjVu image format)
djvulibre-desktop. (a viewer for the DjVu image format)
E-book reader, e.g. FBReader. (it opens ePub, HTML, MHTML, Mobipocket)
E-book Viewer. (it opens ePub, and installs with 'Okular')
gimp-ufraw. (Gimp importer for raw camera images). It is a part of the pre-installed GIMP.
GNOME Mplayer, e.g. gnome-mplayer. (gtk + interface for MPlayer)
Google Chrome (64-bit only). See '**INSTALLING GOOGLE CHROME (64-bit systems)**' elsewhere in this document
Google Earth.It works in 32-bit (so far) and 64-bit. See '**GOOGLE EARTH (don't use the Software Manager to install it)**' elsewhere in this document.
GParted. (a Gnome partition editor)
Htop. (Interactive processes viewer)
Isomd5sum. (Iso9660 checksum utilities)
K3b. (a sophisticated CD/DVD burning application)
KSnapshot. (a screen capture tool)

KsysGuard, e.g. ksys. (a kde task and performance monitor. View the cpu and memory usage)
KsystemLog. (a system log viewer)
Lame: (an MP3 encoding library. An essential frontend)
Leafpad. (a gtk + based simple text editor)
LRF Viewer. (it installs when Calibre is installed)
Minitube. (a Youtube app). See '**MINITUBE**' elsewhere in this document. It shows how to install it in the Terminal.
Nemiver (a stand-alone graphical debugger for Gnome)
Notepad. (it comes with WINE). Preferably, WINE installs with PlayOnLinux.
Okular. (a universal document viewer, PS, PDF, ODT, DVI, XPS, G3 fax, comics. KDE)
Oracle VM VirtualBox. (install e.g. VirtualBox-5.0 to run Windows and Linux virtual machines)
Partclone. (a utility to clone & restore partitions). 'Redo Backup and Recovery' is a frontend to 'Partclone', which does the actual backup and restore. See 'Full backup & restore with 'Redo Backuo & Recovery' further on in this document.
PlayOnLinux. (a front-end for Wine). It will request the installation of some extras. Before installing it, see '**WINE. INSTALLING WINE WITH PlayOnLinux**' elsewhere in this document. It shows how to install it in the Terminal. Once installed, open it then let it update. WINE installs with it if not already installed.
Psensor. (it displays graphs for monitoring hardware temperature)
PyRoom. (a distractionless fullscreen text editor). Once opened, click 'Ctrl' and 'H' to navigate the commands.
QupZilla. (a lightweight web browser based on libqtwebkit) It also reads Mhtml.
Rkhunter. (for rootkits)
Sane. (Scanner graphical frontends)
Shutter. (a feature-rich screenshot program)
Skype. (A client for skype voip and instant messaging service)
SMPlayer. (a complete front-end for MPlayer and MPlayer 2)
Startup Disk Creator, e.g. usb-creator-kde. (using a USB key or SD card for KDE)
Startup Disk Creator, e.g. usb-creator-gtk. (using the above for Gnome)
Sylpheed. (a lightweight e-mail client with gtk+). It is similar to Claws Mail. One drawback is it can't send html. However, it can receive it.
System Profiler and Benchmark, e.g. hardinfo. (it displays a lot of system info)
UFRaw. (a standalone importer for raw camera images)
WINE. It is best installed with PlayOnLinux. See '**WINE. INSTALLING WINE WITH PlayOnLinux**' elsewhere in this document.
Wordview Microsoft doc Viewer, e.g. 'catdoc'. (a Word to tex or plain text converter)
Xfburn. (a CD-burner application for xfce desktop environment. ISO's, audio CD's, etc)
youtube-dl. (This software assists in downloading YouTube videos by line command). See '**YOUTUBE VIDEOS. HOW TO DOWNLOAD THEM**' elsewhere in this document.

A FEW OF THE NON-ESSENTIAL EXTRAS:
(There are about **62-items** listed below)
Asunder. (a graphical audio ripper and encoder)
Audacious. (a small and fast audio player)
Bovo. (Gomoku five in line board game)
CD Player, e.g. Goobox.
Chess 3.8.3., e.g. gnome-chess. (a 2D/3D chess game for Gnome)
ChessX. (a chess database)
Clementine. (a modern music player and library organizer)
Colorcode. (an advanced clone of the Mastermind code-breaking game)
Comix. (a Gtk comic book viewer)
Crafty. (a state-of-the-art chess engine, compatible with X-Board)

DeVeDe. (a simple application to create video DVD's) It removes Mplayer + libavcodec54.
Dropbox. (share and store our files online)
easyMP3Gain. (to modify the loudness of MP3, Ogg Vorbis and MP4 audio files)
Extreme Tux Racer, e.g. extremetuxracer.
Firejail. (it is a sandbox to restrict the application environment). Study it **before** installint it.
FocusWriter. (a fullscreen distraction-free writing program)
Galculator. (a scientific calculator)
Gespeaker. (a gtk + front-end for espeak and mbrola)
GNU Backgammon, e.g. gnubg. (a graphical or console backgammon program with analysis)
GnuCash. (a personal and small-business financial-accounting software)
Gnumeric. (a spreadsheet application for Gnome – main program). **Install the extras**.
gResistor. (resistor colour code calculator)
Gweled: (a diamond mine puzzle game)
Gwenview. (an image viewer)
HomeBank. (to manage personal accounts at home)
HPLIP Fax Utility. (it installs with HPLip Toolbox)
HPLIP Toolbox. (for printing and imaging with some HP units)
The following automatically installs:
hp-lip gui.
hplip.
Hplip-doc.
Hplip-data.
Inkscape. (a vector-based drawing program)
Kbackup. (an easy to use backup program)
kCalc. (a simple and scientific calculator)
KDiamond: (a three-in-a-row-game)
kDiskFree, e.g. kdf. (a disk information utility)
KGeography. (a geography learning aid for kde). It may need a restart.
Kmahjongg. (a mahjongg solitaire game) It may need a restart after installing it.
KMyMoney. (a personal finance manager for kde)
Knights. (a chess interface for the kde platform). It uses GNU Chess, Crafty, Stockfish & Sjeng.
KPatience, e.g. kpat (fourteen solitaire card games)
Kraft. (a small business-management application)
KSudoku. (a sukoku puzzlr game and solver)
LibreCAD. (a computer-aided design cad system)
Mahjongg. (a classic eastern tile game for gnome)
Marble. (a globe and map widget)
Mtink. (a status monitor tool for Epsom Inkjet printers). Also install:
Mtink-doc.
PyChess. (a chess graphical user interface for several chess engines)
PySol Fan Club Edition, e.g. pysolfc. (more than 1,000 solitaire type games)
Qcomicbook. (a qt viewer for comic book archives, cbr, cbz, cba, cbg, cbb)
Rawtherapee. (a raw image converter and digital photo processor)
Remmina. (a remote desktop client for gnome desktop viewing)
Robolinux. See '**VIRTUAL MACHINES AND ROBOLINUX**' elsewhere in this document.
Scan Tailor, e.g. scantailor. (a post-processing tool for scanned pages)
Shisen-Sho, e.g. kshisen (a solitaire game)
Skanlite. (an image scanner for kde, based on gthe Kscan backend)
Sound Converter, e.g. soundconverter. (requires Gstreamer LAME plugin)
Sound Juicer, e.g. sound-juicer. (a CD ripper for Gnome)
soundKonverter. (an audio converter frontend for kde)
Stellarium. (a real-time photo-realistic sky generator)

Sudoku, e.g. gnome-sudoku. (a sudoku puzzle game for gnome)
Supertuxkart. (a 3d kart racing game)
Tetravex, e.g. gnome-tetravex (put tiles on a board and match their edges together)
Xboard. (an x window system Chess Board)
Xmahjongg. (a tile-based solitaire game)
Xpad. (a sticky note application for x)
XSane Image Scanning program. (a graphical frontend for scanner access)

FIREJAIL: Firejail can be downloaded in the Software Manager. It is a sandbox for our web browser to reduce the risk of security breaches. This makes us more secure against hackers and malware. It can also be installed by pasting **sudo apt-get install firejail** into the Terminal. Do **not** install until the pro's and con's have been fully considered.

FIREWALL. The Gufw Firewall comes with the Linux Mint 18 installation DVD, and can be located as follows: Click 'Menu', then 'Preferences', and then 'Firewall Configuration'. At this stage it is not configured. To configure it, paste **gufw** into the Terminal. When the Firewall box appears, click 'ON' into the 'Status:' window. Click 'Deny' into the 'Incoming:' window. Then click 'Allow' into the 'Outgoing' window.

At any time we can check our current DENY IN / DENY OUT settings by pasting the following into the Terminal: **sudo ufw status verbose**. The Firewall can be enabled or disabled by pasting the following into the Terminal: **sudo ufw enable**, or **sudo ufw disable**.

We can also 'ALLOW' or 'DENY' most of the Firewall rules individually. After denying access, we might like to reverse the command. Take the first one that appears in the 'To block incoming Ports:' section below, e.g. **sudo ufw deny 5353/udp**. To allow it after denying it, paste the following into the Terminal: $ **sudo ufw allow 5353/udp**. In other words, replace 'deny' with 'allow'.

An important thing to remember: Avoid the over-use of sudo for ordinary applications, as unnecessary use of it can mess up our files. When we launch an ordinary application, it creates files and directories that are the property of 'root', and not of us. It also changes ownership of some existing files to 'root'.

We can add 'firewall rules' by pasting the following into the Terminal. Wait till each is finished before allowing or denying the next one (ufw stands for 'Uncomplicated Firewall'). We set these rules on our computer to test them, but had to change two of them back, as indicated below. The reason we did this was so we could access those ports for incoming and outgoing emails in our Virtual Machine. Having said that, we only use Sylpheed (in Linux) as our email client anyway.

To block incoming Ports:

sudo ufw deny 5353/udp
sudo ufw deny 5900/tcp
sudo ufw deny 22
sudo ufw deny 25/tcp
sudo ufw deny 135,139,445/tcp
sudo ufw deny 137,138/udp
sudo ufw deny 110
sudo ufw deny 2049
sudo ufw deny 143
sudo ufw deny 21/tcp
sudo ufw deny ssh (Skipping adding existing rule v6)

To block outgoing Ports (except those needed). This configuration will allow the following outbound ports: 20-21, 53, 80, 123, 443 which is all that is required for many users, unless planning on running a server:

sudo ufw deny out 1:19/tcp
sudo ufw deny out 1:19/udp
sudo ufw deny out 22:52/tcp (if allowed, emails will send in XP VM)
sudo ufw deny out 22:52/udp
sudo ufw deny out 54:79/tcp
sudo ufw deny out 54:79/udp
sudo ufw deny out 81:122/tcp (if allowed, emails will load in XP VM)
sudo ufw deny out 81:122/udp
sudo ufw deny out 124:442/tcp
sudo ufw deny out 124:442/udp
sudo ufw deny out 444:65535/tcp
sudo ufw deny out 444:65535/udp

Re-check enable (required): Paste **sudo ufw enable** into the Terminal, then click Enter. If all is secure a message will say 'Firewall is active and enabled on system startup'.

Re-check our changes: We should now re-check our changes. Paste **sudo ufw status verbose** into the Terminal, then press Enter. We can now view a list of 'DENY IN' as well as 'DENY OUT'.

For more information, go to **http://ubuntuforums.org/showthread.php?t=1893751**.

DO WE NEED ANTIVIRUS OR ROOTKIT REMOVERS:
See 'ANTIVIRUS', CHKROOTKIT', and 'RKHUNTER' next. There are good arguments why we do not need any Antivirus or a RootKit removers in Linux Mint, Ubuntu and Debian. However, each person should do their own research here. We installed them, even though they are probably not needed.

ANTIVIRUS: Viruses are **not** a big problem in Linux systems, as viruses that affect Windows operating systems can sit inside a Linux Mint OS without harming it. This means it could be passed on to someone's Windows OS unintentionally. If we install sufficient safeguards in a Linux system, we can reduce this possibility, and perhaps block these viruses.

1. Install **ClamTK**, **ClamAV-base, ClamAV-freshclam, ClamAV-daemon,** and **ClamAV** from the Software Manager. ClamAV is a utility for Unix, and is a command line interface, and Clam Tk is a graphical front-end for ClamAV.

2. They can also be installed by pasting s**udo apt-get install clamav clamtk** in the Terminal. Its main use is in scanning emails. However, the overuse of 'sudo' is not advised.

3. To scan for viruses in the Home directory, paste **clamscan -r /home** into the Terminal, then press Enter. It can take some time to scan the Home directory, but it will give a read-out at the finish.

4. If we need to uninstall clamtk, paste **sudo apt-get remove clamtk*** into the Terminal, then follow the prompts. It can also be uninstalled in the Software Manager.

CHKROOTKIT is a tool that checks the local system for rootkit infections. It contains a chkrootkit: shell script that checks system binaries for rootkit modification. To install, paste ***sudo apt-get install chkrootkit*** into the Terminal, then follow the prompts. To scan with chkrootkit,

open up the terminal and type the command: *$ **sudo chkrootkit***. This will perform some necessary tests.

Though CHKRootKit and RKHunter are similar in what they do, we can still use both.

RKHUNTER: **R**oot**k**it Hunter scans files and systems for known and unknown rootkits, backdoors, sniffers, and malware. The application consists of the main shell script, a few text-based databases, and optional Perl scripts. It can recognise and run external applications like 'skdet' and 'unhide'. It should run on almost every Unix clone. To **run** Rkhunter, open the terminal and paste the following there: **sudo rkhunter --check**. This will perform all the necessary tests. By default, the log file '*/var/log/rkhunter.log.2.gz*' will be created. It will contain the results of the checks made.

The following allows rkhunter to update its text data files by pasting them into the Terminal and completing them one by one: **sudo rkhunter --update**, and **sudo rkhunter --propupd**. We will probably get some false positives when we run rkhunter, which also happens on fresh installations.

NEMIVER: It is a stand-alone graphical debugger for the Gnome Desktop, and can be installed either using the Software Manager or the Terminal. If we wish to install it in the Terminal, then paste **sudo apt-get install nemiver** there. Once installed, it is located in: 'Menu', 'Programming', then 'Nemiver'. For assistance, click on 'Help' at the top of the Nemiver window, and click on 'Contents' or press 'F1'. The Nemiver manual then opens. Once its' manual opens, we can, if we wish, access a number of other manuals by clicking 'Go', and then 'All Documents'.

REMOVING UNNECESSARY PACKAGES: Paste **sudo apt-get autoremove** into the Terminal, press Enter, then follow the prompts to remove any unnecessary packages.

BROWSERS: On the 21st of January 2016, the following message appeared on our 32-bit PC: '**This computer will soon stop receiving Google Chrome updates because this Linux System will no longer be supported**'. In February 2016, the **64-bit** version of Linux Mint 17.3 was installed on our more recent PC, and after opening Google Chrome, the message no longer appeared. (Google Chrome dropped support for 32-bit systems on the 1st March 2016).

It is thought that the owners of other popular browsers may follow suit in due course, by ending support for their 32-bit browsers. If this happens, we may be limited to less popular and smaller 32-bit browsers in 32-bit Linux systems. In this case it may be necessary to install 64-bit operating systems where possible.

The browsers installed on our computers are: 'Chromium Web Browser', 'Firefox Web Browser', 'Qupzilla' (and 'Google Chrome' in the 64-bit system). Chromium, Firefox and Qupzilla worked without any comments about changes in the 32-bit system. The email clients we installed are , 'Claws Mail', '**Sylpheed**', and 'Thunderbird Mail', (as well as 'Gmail' on the 64-bit system).

MAKING FIREFOX OUR DEFAULT BROWSER. How to make the 'Firefox Web Browser' the **default** browser: Click the 'Open Menu' button (at the top right of the page), and click on 'Preferences' from the drop-box. The 'Preferences - Mozilla Firefox' General box appears. Click a tick in the box beside 'Always check if Firefox is your default browser', Then click 'Make default'.

THE ADOBE-FLASH PLUGIN. (adobe-flashplugin) is said to come installed by default in Linux Mint, and works in Mozilla Firefox. In August 2016, the following was pasted into the Terminal on both our 32-bit and 64-bit OS's: **sudo apt-get install adobe-flashplugin**, and got the following: **adobe-flashplugin is already the newest version (1:20160712.1-0ubuntu0.16.04.1)**. To see why, first read: **AN OPTION WHILST INSTALLING LINUX MINT 18**, and then read the following info:

HOW TO INSTALL MEDIA CODECS AFTER INSTALLATION, elsewhere in this document.

PEPPERFLASHPLUGIN-NONFREE. Google Chrome in (**64-bit systems**) uses the 'Pepper API' based flash player, which comes installed by default in its' browser. To see if it is installed, paste the following into the Terminal: **sudo apt-get install pepperflashplugin-nonfree**. A message appeared: **pepperflashplugin-nonfree is already the newest version (1.8.2ubuntu1)**. To see why it was pre-installed, read: **AN OPTION WHILST INSTALLING LINUX MINT 18**, as well as the following info: **HOW TO INSTALL MEDIA CODECS AFTER INSTALLATION**. Both are in this document.

INSTALLING GOOGLE CHROME, (64-bit systems). To install, copy and paste the following into the search engine: **http://support.google.com/chrome/answer/95346?hl=en**. From the list of web pages, click on '**Download and install Google Chrome-Computer-Chrome Help**'. The 'Download and install Google Chrome' page then appears.

Further down that page, and under the heading 'Get Google Chrome', click on 'Download Chrome for **Windows, Mac, and Linux computers**'. In the 'Get a fast, free web browser' window, click the '**Download Chrome**' button (For Linux 'Debian/Ubuntu/Fedora/OpenSUSE').

Click a dot beside '**64 bit .deb (for Debian/Ubuntu)**', then click '**Accept and install**'. After it is downloaded, it can be located in the 'Home' Folder under 'Downloads', and its' name is **google-chrome-stable_current_amd64**. The file size was 49.3MB at the time. To install, double click on it then follow the prompts.

Once installed, double-click on the Google Chrome Icon. A small box appears. It asks 'Make Google Chrome the default browser'. Either leave the tick there, or remove it to suit our preference, then click 'OK' (we left Mozilla Firefox as our default browser). The Google/Chrome browser will now start loading. (*Google Chrome can be installed on a Windows OS from the above web page also*). The recommended way to install or uninstall it is in the 'Synaptic Package Manager'.

GOOGLE'S USER NAME AND PASSWORD (64-bit systems). Once installed, the Google 'Set up Chrome' web page appears. There are two windows to fill in. The first is 'User Name' e.g. email address, and the second is 'Password'. If we **already** have a Gmail Account, then enter that information now (**don't** enter, e.g., our Outlook Express User Name and Password). If we don't have a Gmail account, then enter an email address and password of our choice (**we cannot change these details later, so be careful, as it becomes our primary Gmail account within Google**). A Gmail 'User Name' might be, e.g., **joblo@gmail.com**. Now think up a suitable but complex Password. Once done, click 'Sign in'. The 'Google' screen appears, and towards the top right side, our name appears in tiny print.

ACCESSING OUR GMAIL IN GOOGLE CHROME (64-bit systems). Now that we have set up our Google account, we can send and receive Gmails as follows:

1. Click 'Gmail' near the top right of the Google screen. Our Email Client opens. We can now view the emails sent to us from Google, confirming our account.
2. To send an email. click 'Compose' near the top left. A small 'New Message' box appears.
3. Type the email address of the person we are sending the email to, into the 'To' window.
4. Type the subject of the email into the 'Subject' window.
5. Type our message in the larger window, located beneath the 'Subject' window.
6. Files can be added by clicking the attach icon at the bottom of the box.
7. Click the 'Send' button at the bottom left of the 'New Message' box.

In due course we should receive replies to some of the emails sent by us using our new account. We can do this simply by opening the 'Gmail' screen to receive them. Google is said to allow up to

15GB of storage, free of charge.

GOOGLE EARTH (don't use the Software Manager to install it)
The following worked well for us in pre 03/2016, as it suited our 32-bit and 64-bit Systems. Since March 2016 quite a bit of pixillation has occurred in both systems. Make sure moves 1, 2. and 3 are completed. One by one.

1. Paste **sudo apt-get install gdebi** into the Terminal, press **Enter**, then enter the password.
2. Paste **wget http://dl.google.com/dl/earth/client/current/google-earth-stable_current_i386.deb** into the Terminal, then press Enter.
3. Paste **sudo gdebi google-earth-stable_current_i386.deb** into the Terminal, press Enter, then follow the prompts.

The following method worked no better than the first method did.

1. Open the 'Synaptic Package Manager'.
2. Click the 'Search' Icon near the right top. A small ‘Find’ box appears.
3. Type 'Google Earth' into the 'Search' window, then click 'Search'.
4. Right click on 'google-earth-stable', then click on 'Mark for installation'.
5. Right click on 'googleearth-package', then click on 'Mark for installation'.
6. Click 'Apply' near the top left. Now follow the prompts.
   The correct bit-rate software will be automatically installed.
7. If we wish to remove this package, simply right-click on, e.g. 'googleearth-package', click on 'Mark for removal' from the drop-box, then click on 'Apply' near the top left.

SYLPHEED (MAIL): Sylpheed can be installed from the Software Manager. In our case we also installed 'sylpheed-doc' and 'sylpheed-plugins'. There are additional choices also. One drawback, it can't send html, but it can receive it. Sylpheed is my choice as an email client.

Sylpheed is a free and open source email and news client, and it configures easily. The mail is stored in the **MH** mail file format. It runs on some Linux operating systems as well as some Windows operating systems. Sylpheed saves our emails with an **.eml** case ending when saving them to a folder of our choice. That folder might be on the Desktop, ot a location of our choice.

After Sylpheed is installed, click 'Help', located at the top, then rest the mouse pointer on 'FAQ', then click on 'English' to its’ right. The 'Sylpheed FAQ' screen soon appears. We can then study how it works, and set it up to suit our own needs.

When setting up this free account, our moves are determined by our 'Server type'. The four choices are 'POP3', 'IMAP4', 'POP3 (Gmail)', and 'IMAP4 (Gmail)'. In our case, we have a phone-line connected modem, and selected POP3. The following information will be required: our **server address**, our **username**, and our internet account **password** (e.g. the original password given to us by our Internet supplier, which was Bigpond). We do not require a second paid email account to set up Sylpheed.

If it is set up as follows, Sylpheed simply downloads emails from our original server when required, and without additional cost. We can set it up as follows:

1. Double click the Sylpheed icon. The '**Mailbox setting**' box appears.
2. Click a dot beside '**Create mailbox at the following default location: /home/ e.g. tom/Mail**'.
3. Click 'OK'. The '**New account setup**' box appears. Click a dot beside '**POP3**'. The three other choices were 'IMAP4', 'POP3 (Gmail), and 'IMAP4 (Gmail)'.
4. Click 'Forward'. The next '**New account setup**' box appears. Type the name we want to appear on our emails into the '**Display name:**' window, e.g. Jo or Jo Blo.

5. Type our email address into the '**E-mail address:**' window, e.g. our paid email address name.
6. Click 'Forward'. The next '**New account setup**' box appears. Type our paid email address into the '**User ID:**' window.
7. Type mail.bigpond.com into the '**POP3 server:**' window (in our case).
8. Type mail.bigpond.com into the '**SMTP server:**' window (in our case). Do not click ticks into any of the three tiny boxes.
9. Click 'Forward. The next '**New account setup**' box appears. It says 'Your new mail account has been set up with the following settings. If you want to modify the settings, select 'Configuration - Preferences for current account' or 'Configuration - Edit accounts' in the main menu'. It then displays the following: 'Display name:', 'User ID:', 'POP3 server:', and 'SMTP server'. In our case, the POP3 server is 'mail.bigpond.com:110', and the SMTP server is mail.bigpond.com:25'.
10. Click 'Close'. The 'New account setup' box disappears, and the 'Sylpheed' email client opens.

As previously mentioned, any emails saved are saved in the .eml format. If these emails are transferred to a Windows OS via, e.g. a USB stick, they will open correctly. 'Outlook Express' as well as 'Windows Live Mail' emails downloaded on a Windows OS and copied to Linux Mint will also open correctly in Sylpheed. This is useful, as we have a few old emails we might wish to access.

If we have more than one email client installed, Sylpheed can be set as our Default email client as follows: Right-click on an email stored on, e.g. the Desktop. Place the mouse pointer on 'Open With, then click 'Other Application...'. The 'Open with' box appears. Click on 'Sylpheed' to highlight it, then click 'Set as default' (near the bottom of the box), then click 'OK'. From then on, whenever we double-click on a stored email, Sylpheed will open it.

CLAWS MAIL: Claws Mail can be installed from the Software Manager. In our case we also installed 'claws-mail-pgpmime', 'claws-mail-address-keeper', 'claws-mail-archiver-plugin', and 'claws-mail-doc'. There are additional choices which can be added as required. We can run Claws Mail and Sylpheed on the same computer in Linux without any conflicts, especially as Sylpheed was previously set as the Default email client. If we prefer, we can set up Claws Mail as the default email client instead.

The case ending: Claws Mail emails that are downloaded in Linux, then later transferred by flash drive to a Windows OS, did not open (in the Windows OS), until we typed **.eml** as the case ending to the emails. They then open correctly. Sylpheed emails transferred from a Linux Mint OS to a Windows OS open without this adjustment.

Some history: Claws Mail is a free and open source, GTK+ based email and news client. It configures easily and has a number of choices. The mail is stored in the **MH** mailbox format. Claws Mail can run in both Linux Mint and in some Windows operating systems. It was previously known as Sylpheed-Claws.

The Manual: After Claws Mail is installed, click 'Help', which is located at the top, then click on 'Manual'. The 'The Claws Mail User Manual' screen appears. We can set it up to suit our needs.

Some setup info: When setting up the free account, our moves are determined by our 'Server type'. The three types are 'POP3', 'IMAP', and 'Local mbox file'. For our needs we selected POP3. The following information is requested: our **server address**, our **username**, and our internet account **password**. If we don't enter our password at setup, then we will have to enter it each time we login to it, which makes it more secure. If we already have Sylpheed installed and setup, then when we go to setup Claws Mail, we will be given the option to select the same setup in just a few clicks.

1. Double click the Claws Mail icon. The '**Welcome to Claws Mail**' box appears.
2. Click 'Forward'. The '**About You**' box appears. Type the name we want, into the '**Your Name**:' window, that is, the name we want to appear on our emails. It might be Jo Blo. We will have to delete the name that first appeared there.
3. Type our current email address into the '**Your Email Address:**' window. This is the email address that we had before installing Claws Mail. In our case it is our paid Bigpond email address. We then typed 'Nil' into the '**Your Organization:**' window.
4. Click 'Forward'. The '**Receiving mail**' box appears. Click 'POP3' into the '**Server type:**' window.
5. As our current account is with Bigpond, we typed 'mail.bigpond.com' into the '**Server address:**' window.
6. We typed our current Bigpond email address into the '**Username:**' window.
7. We typed our current Bigpond email account 'password' into the '**Password:**' window. We did not place ticks in the two tiny boxes, and we did not fill in the 'Client SSL certificate (optional)' windows.
8. Click 'Forward'. The '**Sending mail**' box appears. In our case we typed 'mail.bigpond.com' into the '**SMTP server address:**' window, and left the remaining tiny boxes and windows blank.
9. Click 'Forward'. The '**Configuration finished**' box appears. It says 'Claws Mail is now ready. Click Save to start'.
10. Click 'Save'. The Claws Mail screen appears and is ready to go.

HIBERNATION, HOW TO SUSPEND IT. **Taking steps to suspend Hibernation may be RISKY to the System**. In Linux Mint, Hibernation (suspend-to-disk) is enabled by default.

RESETTING THE COMPUTER'S PASSWORD: (This **DID** work as expected)
Type **sudo passwd** into the Terminal and press 'Enter'.
Type our current password in the Terminal then press 'Enter'. 'Enter new UNIX password:' appears.
Type in our new password then press 'Enter'. 'Retype new UNIX password:' appears.
Retype our new password then press 'Enter'. A message then says ‘password updated successfully’.
We now have a new password. Be sure not to forget it.

CHANGING THE PC’s HOSTNAME AND USER NAME: (**This did NOT work as expected**)

RAR. How to install it: Paste **sudo apt-get install rar** into the Terminal, press Enter, then follow the prompts. It is useful software.

WINE. INSTALLING WINE WITH PlayOnLinux: When we install 'PlayOnLinux', 'WINE' also installs with it. 'PlayOnLinux' can be installed by pasting the following command in the Terminal: **git clone https://github.com/PlayOnLinux/POL-POM-4**. During the download, it may request the installation of both ‘curl’ and ‘p7zip-full’, etc, and if so, allow it.

When the installation is finished, and whilst installing the first .exe file, e.g., a game that suits a Windows OS, we will be prompted to further update either WINE or PlayOnLinux (it can take some time). Only a small percentage of Windows software work in WINE.

SOME WINDOWS SOFTWARE THAT INSTALL IN WINE: Following is a list of the files that were successfully installed in WINE. However, some of them may depend on the computer’s hardware. Not all Windows software run in WINE, but those listed below worked straight off. The main computer used for this document was a Dell OptiPlex 780, 3x4. As this is our own list, there are not many Windows programs included.

The following are all **.exe** files: **To install, right-click on the .exe file, then click or navigate to 'Wine Windows Program Loader', then follow the prompts**. To play or run the software, click

'Menu', rest the mouse pointer on 'Wine', then click on the program's icon we wish to run. Alternatively, create a Folder on the Desktop, then paste the icon shortcuts into it to access them quickly. Anyway, most of the shortcuts automatically appear on the Desktop after installation, and some do not. These can be located in the WINE section.

1By1 (free): It is an excellent music player. Download and run the '1by1_183.exe' file. Then navigate to the mp3 music folder the first time to play them.
7-Zip File Manager (free): It works well unzipping files.
Cram Jam (free): By Redclaw. An excellent brain game. Download 'cramjamsetup.exe'.
Crimson Skies 1.0 32-bit Trial (free): It is an aircraft game, and has no time limit on the Trial. We might have to restart the PC after playing it. Download and run 'crimsontrial.exe'.
FastStone MaxView 2.1 (free): Download the 'FSMaxViewSetup21.zip'. Inside the zip file is 'SMaxViewSetup21.exe'. Install the .exe file. An excellent 10/10 viewer.
FastStone Photo Resizer 3.0 (free): Download the 'FSResizerSetup30.zip'. Inside the zip file is 'FSResizerSetup30.exe'. Install the .exe file.
FLV to MP3 Converter (free): Download the ' flvtomp3converter_setup.exe' file and install it.
Free Batch Photo Resizer Portable 2.1 (free): Download & install the 'PhotoResizer.exe' file.
ImgBurn (free): This burning tool works well. Download and run 'SetupImgBurn_2.5.8.0.exe'.
Leadfoot: **Stadium Off-Road Racing Demo 2001** (free): Created by 'Ratbag'. There is no time limit on the demo. Available from the Internet Archive by entering 'Classic PC Games', and 'All Media Types'. It can be found under 'L'. Download and run 'leadfoot.exe'.
Microsoft Midtown Madness 2 Trial (free): A car racing game, with no time limit. Download and install 'mm2trial.exe'.
Microsoft Motocross Madness 2 Demo (free): This demo has no time limit. Download and install 'motocxm2.exe'.
Mok v1.4 (free): By MyPlanetSoft. An Anti-Keylogger for Online Banking, etc. Download and run 'mok.exe'. Click 'Open With', then 'Wine Windows Program Loader'. Mok does not install, but runs as a portable program. Close immediately after using it to protect our passwords. Download from 'myplanetsoft.com/help/mok'.
Neo's SafeKeys v3.1.4 (free): An Anti-Keylogger for Online Banking. Gizmo rates it at 5 out of 5. Download and install 'Neos-SafeKeys-v3-1-4-Setup.exe'. Download from the following site: 'Neo-s-SafeKeys/3000-2144_4-75833719.html'.
Pretty Good Solitaire (free): There are about 500 games included. Download and install 'gdsol500.exe'. Some versions have been changed, so look for an original file. We rate it highly.
Resistor Colour Code Solver Portable 1.3.1. (free): Download and install the following file: 'Resistor Colour Code Solver.exe'.
The Sage English Dictionary and Thesaurus Portable (free):
Tick5Portable (free). Download and install 'Tick5Portable.exe'.
TTTCube 3.4b (free): Download 'TTTSetup.zip'. Install 'TTTSetup.exe'.
WinDjView v2.0.2 (free). Download and install 'WinDjView-2.0.2-Setup.exe'. Download from **sourceforge.net/projects/windjview/files/WinDjView/2.0.2/**. This is an executable file which installs the full file. (*Okular also works well, which is Linux software)*.
Ywriter 5 (free): yWriter is a free word processor that breaks projects into chapters and scenes. Though it is free, we are encouraged to register it. Download and install 'yWriter5Full.exe'.

1. LOCATING THE PROGRAM FOLDERS IN WINE: Start by clicking on 'Menu', then go into the 'Wine' section and click '**Browse C: Drive**', which is located at the top of that section. Double-click on the '**Program Files (x86)**' folder. The previously list of software for Windows systems will appear here in their respective folders (if they were installed).

2. LOCATING THE PROGRAM FOLDERS IN WINE: In Linux Mint 18, one way to locate the 'Program Files (x86)' folder is as follows: Open the 'Home' folder (on the Desktop), right-click on

any empty space inside the 'Home' folder, then click 'Show Hidden Files'. A number of extra folders appear. The '.**wine**' folder is usually the last folder inside in the Home folder.

Double-click on the '.**wine**' folder to open it, then double-click on the '**dosdevices**' folder. Double-click on the '**C**:' folder, then double-click on the '**Program Files (x86)**' folder. The previously listed software for Windows systems appears here in their respective folders (if they were installed). When Linux Mint 18.1 is released, this particular method may or may not apply.

To return the 'Home' folder to its' previous state, right-click on any empty space in the Home folder, then click on 'Show Hidden Files' once again.

UNINSTALLING PROGRAMS IN WINE:
Click '**menu**' on the Desktop, go into the 'Wine' section then click '**Uninstall Wine Software**', located towards the bottom. The '**Add/Remove Programs**' box appears. Now follow the prompts. If this is not successful, we can right-click on the program in WINE that we wish to remove, click 'Uninstall', then follow the prompts. It is best to remove any associated files that are left over in this section afterwards, so as not to clutter this section.

Once a program is uninstalled from the Wine section, its' install folder often remains in the 'Program Files (x86)' folder. To remedy this, go into that section and delete the leftover folder. Do **not** delete the 'Program Files' folder.

Some software can be uninstalled from the 'Program Files (x86)' folder by right-clicking on its 'uninstall' file (if it has one), clicking 'Open With', and then 'Wine Windows Program loader'. Wine will then run the uninstall of the program. However, it may be best to use the first method.

MONO: **It may be best not to remove Mono**. Mono comes installed by default, but is said to be a security risk, as it offers 'applications that run in Windows systems' a limited opportunity to run in Linux, which may also unintentionally include malicious software.

VIRTUAL MACHINES AND ROBOLINUX: Robolinux is the only software that we have had to pay for up to date in Linux Mint. It is cheap and runs well. If wishing to install a Windows Virtual Machine, then a secure way to run it is within 'Robolinux Stealth VM for Linux Mint'. Robolinux can run Windows XP, Windows 7, and Windows 10 within a secure partition, in both 32-bit 64-bit. Instruction manuals are available. Once installed, it uses Oracle VM VirtualBox to run the Windows systems. Robolinux runs on a variety of Linux systems, and can be purchased from the following web address: '**www.robolinux.org**'. When the page opens, find 'download for' (located near the top of the page), click on 'Linux Mint' (underneath it), then follow the prompts. The 'robolinux-stealth-vm-software.deb' installation file is very small (tiny but remarkable). Immediately after installing a Windows OS within Robolinux, open it (e.g. Windows XP), then do the following:

1. **Disable** 'Windows Updates'.
2. **Disable** 'System Restore'.
3. Do **not** install an antivirus.
4. Do **not** install any security software.
5. Do **not** defrag Windows.
6. Leave the 'Firewall' **on**.
7. Do **not** store data on the Windows VM Desktop.
8. Store **all data** in the '**vboxsrv' (E:)** shortcut (located on the Windows VM Desktop).

If the above do's and dont's are not adhered to, then the size of the Windows OS within Robolinux will grow out of all proportion in size. It might be a good idea to keep a copy of the Windows VM

OS on an external HDD. If it is XP Pro, then it will be named **Microsoft_XP_Pro**, and can be located after its' installation as follows: Open the 'Home' folder (located on the Linux Mint Cinnamon Desktop), then open the 'Virtual Vms' folder that is located in it. It is a '**vdi**' file.

If an infection or an error should ever occur (which we have never encountered), simply click on 'Restore your Windows Virtual Machine' (visible in Linux when 'Menu' is clicked), and it will be restored to its' previous VM backup status, that is, to the last backup that was made (if one was made). Even though we installed a lot of programs in XP VM within Robolinux, it still ran fast, and booted up in about twelve seconds or so each time, ready to run. Remember to read the instructions carefully. It is very simple to install.

The **'vboxsrv' (E:)** Drive is a shortcut that appears on the Windows VM Desktop, and it allows access between Linux and Windows, to and fro. The data in this partition is also located in the Host machine's **Home** folder/ **Documents** Folder/ **chessdata** folder. The identical data is accessible in both the Host and the Guest machines. The Host machine in this case is Linux Mint 18 Cinnamon.

Take the time to read all of the Robolinux Documentation, which can also be purchased from their website.

Installing Robolinux: First go to the Robolinux Homepage, choose the package that suits Linux Mint Cinnamon, make the suggested donation, then download the package installer and follow the installation prompts. Once installed, the options for setting up a Windows VM can be located by clicking 'Menu' on the Linux Mint Desktop. If we wish to set up, e.g. Windows XP Pro 32-bit, then click on '**3a. Windows XP (32) VM Installer**'. The '**Robolinux XP 32 Bit Virtual Machine Installer**' box appears. It says '**This Windows XP 32 bit VM installer will automatically build and configure a virtual machine for your Windows 32 bit Home or Pro version in less than 30 seconds. After this VM installation has finished you need to load your Microsoft licensed Windows XP 32 bit disk into your CD or DVD drive and load VirtualBox which you can find in your software applications inside Linux. Then click on the top green right arrow start button to load your Windows XP install disk. You will then see the Microsoft XP installation menu. Now you can simply install XP normally. Please note that…**'. It then says '**Please Press enter to continue**'. Now follow the prompts.

If we decide not to use Robolinux, we can still run Windows in 'Oracle VM VirtualBox', though the usual security software would be required for the various OS's, an Antivirus would have to be installed, and Windows Update would have to be switched on. As a further security precaution, we can save a copy of the VM's OS to an external HDD.

GRUB CUSTOMIZER: **It may be risky to use, but you may think otherwise**.

LAPTOPS. IMPROVING BATTERY LIFE: The following Terminal commands may improve the battery life of Laptops, as well as reducing some of the overheating. TLP is a power management tool to help achieve this. No configuration is required. To install it, paste the first line into the Terminal, press 'Enter' then follow the prompts. When completed, go to the next line and do the same, and so on.

sudo add-apt-repository ppa:linrunner/tlp
sudo apt-get update
sudo apt-get install tlp tlp-rdw
sudo tlp start

USB STICK FORMATTER: To format a flash stick, first insert it into the computer's USB

connection, then close any window that opens. Next open the '**USB Stick Formatter**' program, which is downloadable from the Software Manager. In the 'Format:' window, click the drop-box to make the flash drive's name appear. In this case it is named '**1000 (/dev/sdb) – 8GB**'. Now click on its' name to stop its' name from disappearing.

Click the drop-box in the second window. The formatting choices are 'FAT32', 'NTFS', and 'EXT4'. In this case we will choose '**FAT32**'. Click 'Format'. A box appears which says 'This will destroy all data on the target device, are you sure you want to proceed?' Enter the computer's password, then click 'Authenticate'. Presently a small box appears which says 'The USB stick was formatted successfully'. Click 'OK'. Once done, remove the flash drive.

FORMATTING A HDD FOR LINUX WITH GPARTED: GParted is available to download from the Software Manager, and is fast to navigate once installed.

We will now format, e.g., an external **250GB** HDD, which in this case will be connected to the computer via a USB Docker. The one we have used for some time is named '**ALL IN 1 HDD Docking**' with SATA USB2.0/ 3.0 capability. A web search will list others. This particular 250GB HDD will appear as **232.88/ 89 GiB** in size. Once the drive is formatted, it can then be mounted inside a computer in preparation for installing Linux Mint to it.

GParted can format an entire drive (as follows), or it can partition the drive instead. When we install Linux Mint, as it automatically installs to the entire drive, then we have no need to create partitions. The use of partitions is useful e.g. in a Windows OS, as Windows can install to one partition, and store date to the second one.

01. Connect the Docker (with the HDD inserted) to the computer, then switch it on.
02. Open the GParted program, and enter the computer's password when requested. The GParted screen appears, listing the computer's 'ext4', 'extended', and the 'linux-swap' file systems. *The external USB connected HDD will not be listed at this early stage, unless it has been previously formatted.*
03. Click on '**GParted**', located at the top-left side of the GParted screen. A drop-box appears.
04. Rest the mouse on '**Devices**' (located in the drop-box), then slide the mouse to the right in the window and click on the USB connected HDD (be careful not to click on the wrong one). In our case it was '**/dev/sdc (232.89 GiB)**'. A window now appears near the top of the GParted screen, and '*/dev/sdc1 232.88 GiB*' appears in it. If the external HDD has previously been formatted, then a solid green line will surround that window. If it has not been previously formatted, it will then say '*Unallocated 232.88 GiB*', and will be outlined with dots.
05. *If the external HDD has previously been formatted, then it will have to be 'unmounted' before it can be re-formatted. To unmount it, right-click in the window named '/dev/sdc1 232.88 GiB', then click '**Unmount**' from the drop-box. If 'Unmount' does not appear there, then click within the dotted lines to close the drop-box. The solid green line around this box is then replaced with a dotted line. We can now proceed to format this external HDD.*
06. Click '**Device**' at the top of the GParted screen. A small drop-box appears.
07. Click '**Create Partition Table...**' from the drop-box. A message says: 'WARNING: This will ERASE ALL DATA on the ENTIRE DISK /dev/sdc'.
08. In this case we left '**msdos**' into the 'Select new partition table type' window.
09. Click '**Apply**'. The above warning message soon disappears, and 'unallocated 232.89 GiB' appears in the top window. This window is grey, and it is outlined with dots. We can now partition the external HDD the way we want it.
10. Click '**Partition**' at the top of the GParted screen. A drop-box appears.
11. Click '**New**' from the drop-box. A 'Create new Partition' box appears. We can now enter the information we want into this box. As we are only formatting the external HDD and not creating

a partition, then leave the full HDD size there, in this case 238474 in the '**New size (MiB)**' **Window. NOTE**: As there are 1024kb to one Megabyte, then 238474 divided by 1024 equals 232.88GB (which is our 250GB HDD).

12. Click e.g. '**Primary Partition**' into the 'Create as:' window.
13. Now select the type of file system we want. Linux uses ext2, ext3, and ext4. However, it also recognizes fat16, fat32, jfs, linux-swap, lvm2 pv, ntfs, reiserfs, xfs, cleared, and unformatted. Click '**ntfs**' into the 'File system:' window. All remaining windows are left as they are. (Later on, when Linux is installed to this HDD, then ntfs will be automatically replaced with ext4).
14. Click the '**Add**' button in this box. The '/dev/sdc - GParted' screen changes. The large window now says 'New Partition #1 232.88 GiB', and is outlined by a solid green line. '1 operation pending' appears at the bottom left.
15. Click in the area outlined in green to apply our selections and begin the process. The following now appears towards the bottom of the GParted screen: 'Create Primary Partition #1 (ntfs, 232.88 GiB) on /dev/sdc'.
16. To proceed with '1 operation pending', click '**Edit**' at the top of the '/dev/sdc - GParted' screen. A drop-box appears.
17. Click '**Apply All Operations**' from the drop-box. The 'Apply operations to device' box appears. It says 'Are you sure you want to apply the pending operations?'
18. Click '**Apply**'. The 'Applying pending operations' box appears. It says 'Depending on the number and type of operations this might take a long time'. In the 'Completed Operations' window it says 'All operations successfully completed'.
19. Click '**Close**'. **Note**: As soon as we click 'Close', the formatting of the external HDD starts, and quickly finishes. The '/dev/sdc - GParted' screen now says '/dev/sdc1 232.88 GiB' in the top window, which is outlined with a heavy green line. At the very bottom left of the screen, it says '0 operations pending'. This means that the formatting of the HDD is complete.

MINITUBE: If we install Minitube from the Software Manager, the latest version might not be available. Instead we can install it using the Terminal as follows:

For the 32-bit version: Paste each of the following (three) entries into the Terminal, one by one, then press Enter after each paste. Note that the two lines in **1**. must be copied and pasted into the Terminal all at once.

1. sudo apt-get install libqt5widgets5 libqt5network5 libqt5script5 libqt5sql5 libqt5sql5-sqlite libqt5dbus5 phonon4qt5 libphonon4qt5-4 phonon4qt5-backend-gstreamer
2. wget -O minitube32.deb http://flavio.tordini.org/files/minitube/minitube.deb
3. sudo dpkg -i minitube32.deb

For the 64-bit version: Paste each of the following (three) entries into the Terminal, one by one, then press Enter after each paste. Note that the two lines in **1**. must be copied and pasted into the Terminal all at once.

1. sudo apt-get install libqt5widgets5 libqt5network5 libqt5script5 libqt5sql5 libqt5sql5-sqlite libqt5dbus5 phonon4qt5 libphonon4qt5-4 phonon4qt5-backend-gstreamer
2. wget -O minitube64.deb http://flavio.tordini.org/files/minitube/minitube64.deb
3. sudo dpkg -i minitube64.deb

To view Youtube videos, open Minitube, then type in a keyword. The keyword might be, e.g. 'humour', etc. Now select from the dropbox. If unsure if the media is copyrighted, then do not view it.

YOUTUBE VIDEOS. How to download them: One way to download videos is by line command

(**only download legal videos**). The following works in 32-bit and 64-bit Linux Mint 18 Cinnamon.
1. Open the Software Manager, and install **youtube-dl** (install it once only).
2. Now go to '**www.youtube.com/**' and do a video search. Once located, click on it to play it.
3. While the video is playing, right-click on it, then click 'Copy Video URL'.
4. Stop the video and open the 'Terminal', and type **youtube-dl** into the line command.
5. Allow a space between 'youtube-dl' and the url. The url must be enclosed in single or double inverted commas, e.g. **youtube-dl 'place the url here'**. Note the space after **dl**.
6. Press 'Enter' on the keyboard. The video should now be saved to the 'Home' folder.

The above works well, but not everything downloads. However, should we wish to select some extra options before downloading, then proceed as follows:

If we want to see the formats and resolutions available before we start downloading, type the following into the Terminal: **youtube-dl -F "url"** (there is a space after **dl** and **F**, and F is a high case letter). As above, the url of our choice is enclosed in single or double inverted commas. When we press the 'Enter' key, a number of download choices appear, listed under 'format', 'code', 'extension', 'resolution', and 'note'.

The next step is to download a video in the format and resolution of our choice as follows: Select the number that appears in the 'format' column that represents our choice of video. In this particular case we will select '**18**'. Type **youtube-dl -f 18 'url'** into the Terminal (there is a space after '**dl**', '**f**', and '**18**'. Also, '**f**' must be a lower case letter for downloading this way). As above, the url of our choice is enclosed in single or double inverted commas. Press the 'Enter' key, and the video will download to the 'Home' folder.

If the video clips rarely download as indicated above, then read '**HOW TO INSTALL MEDIA CODECS AFTER INSTALLATION**' in this document, which might assist. After installing the codecs, the Terminal will sometimes switch to downloading the video clip in the '**mkv**' format, which is OK. Whilst downloading this way, a few error messages may appear, before it switches to mkv.

VIDEO TO MP3 CONVERSION. First install '**SoundKonverter**' and '**easyMP3Gain**' from the Software Manager. Run SoundKonverter, then navigate to a previously downloaded legal e.g. flv file we wish to convert to an mp3 file. Once converted, the file will be saved to the Home folder in the soundKonverter sub-folder. If a number of mp3's have been converted from e.g. flv's, and we wish to burn them to a CD, it is a good idea to make them play at a similar volume, otherwise one might be loud while the next one might be soft. This is where easyMP3Gain comes in. It can adjust a number of mp3's in a folder to a similar volume before burning them to CD. 'Out of copyright' music can be downloaded on the Internet. One location is said to be the 'Internet Archive'.

Another free converter is 'FLV to MP3 Converter Free'. This software was made to run in some Windows systems, but also works well in WINE within Linux.

'FF Multi Converter' is highly rated as a multi converter, and is said to run in Linux. Their Home Page is: **https://sites.google.com/site/ffmulticonverter/** - A link on this Web Page gives its multi-conversion details. We have not tried it.

DEFRAGGING. As **ext4** is the default file system for Linux, then fragmentation does not often occur, and as the management system used by Linux Mint is 'dpkg', then we inherit the 'apt-get' system in the Terminal. For example, if we want to remove packages that are no longer needed and are cluttering up the system, simply copy and paste **sudo apt-get autoremove** into the Terminal, enter the Password, then press 'Enter'. We can also copy and paste **sudo apt-get autoclean** into the

Terminal to clear the local repository of retrieved packages that are mostly useless.

As Linux systems spread installed files all over the HDD with considerable free space surrounding them, this allows most files to grow without being split into fragments. Consequently, we don't have to worry about fragmentation until about 80% or more of the drive is filled with installed files and data. Anyway, If a problem should occur, the file system attempts to move any files around to reduce fragmentation.

If we are experiencing problems with fragmentation, then it may be time to get a bigger Hard Drive. On the other hand, we could do the following: First copy and paste (not cut and paste) all of our data to an external HDD. Once our data is successfully transferred, we can then delete all our data from the computer's drive. Next copy and paste (not cut and paste) all our data back to our computer's drive from the external HDD. This should remove any fragmentation.

SCREEN CAPTURE: **KSnapshot** is an excellent choice. However, on one occasion a problem occured as follows:

The KSnapshot jpg image of the Desktop was saved to a folder located on the Desktop. After opening that folder, everything on the Desktop disappeared from view, except for the Panel. The image would not close after pressing ‘Escape’ on the keyboard.

This was resolved as follows: Re-open KSnapshot by clicking 'Menu' (still visible on the Panel), then 'All Applications', and then 'KSnapshot'. Once open, select any type of snapshot, then click 'Save As'. The '**Save As - KSnapshot**' folder opens to the same location as the previously saved jpg. Do not click 'Save'. Instead, delete the faulty jpg image from that folder to fix the problem.

KINDLE. After installing the current Kindle .exe file in WINE, we later uninstalled it as it worked erratically. One successful way to read Kindle eBooks is to read them in the **Cloud**. To set it up, first go to **www.amazon.com/CloudReader** and enter our details into the 'kindle cloud reader' page. We can now purchase eBooks to read there.

Another option for Kindle eBooks is as follows: first install RoboLinux, then Oracle VM VirtualBox (if not installed already), then install e.g. ‘Windows XP' within VirtualBox. See '**Virtual Machines and Robolinux**' elsewhere in this document. We can then install Kindle in a Windows operating system. We have had no problems reading Kindle eBooks using this method.

BACKUP WITH APTonCD. To backupup the computer’s installed packages, we must first install ‘APTonCD’, using the Software Manager. Once installed, APTonCD can back up the computer’s packages to a folder in the Home Folder, while further moves within ApTonCD can backup the packages to a DVD as an image. The backup can then be restored to the computer, if its’ files become damaged. Alternatively, any files within the image can be restored individually. It is always better to install or reinstall files using the Software Manager, though it could be useful to have a DVD on standby just in case.

FULL BACKUP & RESTORE WITH 'REDO BACKUP & RECOVERY':
Redo v.1.0.4 is a free backup and restore tool for both **Linux and Windows**:

In this example, Linux Mint 18 Sarah Cinnamon (64-bit) was recently installed on a computer with a 500GB HDD, after which about 113 other programs were also installed. The reason for the 500GB drive was to create an image that could easily be installed on any similar or larger size drives on the same, or another computer. The created image will not install to smaller C: drives.

First install '**Partclone**' from the Software Manager before creating the image. Partclone is a utility to clone & restore partitions. Once installed, locate the 'Redo' web page and download the free '**Redo v.1.0.4**' ISO (or later if available), which is about 261.5MB in size, then burn it to a DVD as an active ISO. 'Redo Backup and Recovery' is a front-end for 'Partclone', which does the actual backup and restore. In Linux, the 'K3b' or '**xfburn**' software are good choices to create an active ISO.

As stated, the size of the computer's HDD for this test was 500GB, and the size of the external HDD that the image was to be backed-up to was 500GB. However, the external HDD could have been much **larger or smaller**, as the backed up and compressed image of the 500GB HDD turned out to be 23.7GB in size.

If using a new external HDD to store (not install) the image to, then format it to NTFS with GParted before proceeding. It will store the image in its' own folder without deleting any unrelated data on that drive if done correctly. Our external HDD was already in the **ntfs** format, and the image was stored on it without any problems.

If wanting a flawless image, then create it soon after installing the OS together with all of the additional software required. It is best not to wait days or months before doing so, in case the computers' system might become compromised for one reason or another.

Creating an image of our computer's 500GB Drive.
We will now create an image of our Linux Mint Sarah Cinnamon 64-bit 500GB HDD. A 64-bit image is noticably larger than a 32-bit image. A 32-bit image will suit some older computers.

01. Start the computer.
02. Insert the active Redo ISO DVD into the computer's drive.
03. Cancel any box that appears.
04. Turn the computer off (fully).
05. Plug in the external HDD that we wish to store the image to, then switch the external HDD on (if it has a switch). The external HDD drive can have a mixture of data on it.
06. Push the computers' start button, then quickly and often **press F12** on the keyboard until a response occurs. Sometimes it is best not to press F12 until the monitor flickers.
07. The 'Boot Device Menu' box appears. There are a number of options. Click on '**Onboard or USB CD-ROM Drive**' to highlight it, then click 'Enter' on the keyboard.
08. The 'Redo Backup & Recovery' screen appears. There are some choices. The first four are 'Start Redo Backup', 'Safe Mode', 'Check CD for Defects', and 'Memory Test'. As '**Start Redo Backup**' is already highlighted, just click '**Enter**' on the Keyboard.
09. After a few minutes or so the 'Welcome - Select an Option' screen appears. It says 'Easily create a backup image of your Computer, or completely restore from one. Click an option to begin'. There are two options, 'Backup' and 'Restore'. Click on '**Backup**'.
10. The 'Backup - **Step 1**: Select source drive' screen appears. It says 'Click on the box below to select the source drive that we would like to create a backup image from'. We selected '**Drive 1 (465.76GB): WDC WD5000AAKS-0 (Linux Mint 18 Sarah (18), 457.89GB EXT4) (7.87GB SWAP)**. This is the size of this computers' drive, e.g. 500GB, and not what is on it. Two other choices were available by clicking the arrow beside the window. These other choices were '**Drive 3 (465.76GB): 00AADS-00S9B0 (465.76GB NTFS)**' e.g. the 500GB external drive we will back up (not install) the image to, and '**Drive 19 (249.37MB): DRW-24D5MT**'. Do not select any of these last two. Click '**Next**'.
11. The '**Step 2**: Select Partitions to Save' screen appears. It says 'Select which parts of the drive to create a backup of. Leave all parts selected if you are unsure'. In the 'Save Description' section the following appears: '**Drive 1, Part 1: (457.89GB EXT4) Linux Mint 18 Sarah (18)**', as well as '**Drive 1, Part 5: (7.87GB SWAP)**'. Both drives are already selected. Leave them

selected. Click '**Next**'.

12. The '**Step 3**: Select Destination Drive' screen appears. It asks '**Where is the destination drive?**' There are two options: 'Connected directly to my computer' and 'Shared over a network'. Select the first choice. In the 'Select destination drive' window, the ext. HDD appears there as follows: '**Drive 3: (465.76GB NTFS)**'. Click '**Next**'.
13. The '**Step 4**: Select Destination Folder' screen appears. It says 'Click browse to select or create a folder on the destination drive where your new backup image will be saved'. It further says 'The folder a backup is saved in is usually a description of the computer. e.g. office 1 or zack-laptop'. There is a '/' in the narrow window. Click '**Browse**'.
14. The 'Select a Folder' box appears. It has four tabs at the top, two of which are named 'mnt' and 'backup'. There are four headings on the left side of the box named 'Search', 'Recently Used', root', and 'File System'. Any previous backups of the system that are on the external HDD will appear in their own folders within this window. Click '**Create Folder**' at the top right.
15. A message says 'Type name of new folder'. I typed '**20160710**', then **clicked once** on the left side of 20160710 to open its' folder (e.g. on the blue box, which is about ¼ inch or 6mm square) . This will enable the download to go into this folder. 2016.07.10 now appears to the right of the 'Backup' tab at the top. Click '**Save Here**'. We are returned to the 'Step 4: Select Destination Folder' screen, and '/2016.07.10' now appears in the narrow 'Browse' window.
16. Click '**Next**'. The '**Step 5**: Name Your Backup' screen appears. It says 'Provide a unique name for this backup image, such as the date. Today's date is automatically entered for you below'. It then says 'You may only use letters, numbers, and dashes in your backup name'. As '20160710' already appeared there, we left it as it was. This represents the 10th July 2016. Alternatively we could have added '500GB' to identify which drive the image came from.
17. Click '**Next**'. The 'Creating Backup Image' screen appears. It says 'Backing up your system to the location you selected. This may take an hour or more depending on the speed of your computer and the amount of data'. A message soon says 'Reading bitmap for part 1 of 2'. Soon a narrow window appears listing the amount of progress. Below this window it says 'Part **1 of 2** (x%) x elapsed, x remaining' (e.g. x is time).
18. When the 'Part 1 of 2' backup completes, then the 'Part **2 of 2**' backup automatically commences in the same screen, which is a smaller backup. When this download finishes, a message in the narrow window says '100.00% Complete'. A tiny box shortly appears that says 'Backup image saved in x minutes'. In this case it was **30.2** minutes, and the size of the backed-up image to our ext. HDD was **23.7**GB. The free space on our computers 500GB 'C: Drive' was 431.4GB. Now click '**OK**', and when the tiny box disappears, then click '**Exit**'. The computer we backed up was a recent model, and the backed up image was made up of sixteen parts.
19. Now remove the DVD, and turn off the computer by clicking on the turn off button near the bottom right of the screen. The ext. HDD can shortly be turned off or removed, and the computer may now be restarted. To measure the size of the backed-up file, connect the ext. HDD, and then navigate to that file.

Restoring the backed up image to the same PC: (It can also be restored to another computer). We are about to restore the image to the same computer's 500GB HDD. This computer already has Linux Mint 18 cinnamon 64-bit on it. Before we can restore the image to it, we must first remove the computers HDD and format it completely to NTFS, using another computer. In this case, we will use Gparted to do that. Once finished, the HDD can be screwed back into the computer in readiness for the image to be installed to it. We will now show how to restore the previously made image (already stored on an external HDD), to the same computer. Such action are only necessary when the operating system on the computer's HDD becomes badly infected, which is very unlikely. Note: The image was restored to the same computer for the sake of data for this manual. Also, the HDD placed in the PC could have been larger if desired, but not smaller.

01. Start the computer.

02. Insert the active Redo ISO DVD in the computer's drive.
03. Cancel any box that appears.
04. Turn the computer off (fully).
05. Plug the external HDD that contains the backed up image into the computer's USB socket, then switch it on (if it has a switch).
06. Push the computers' start button, then quickly and often **press F12** on the keyboard until a response occurs. Sometimes it is best not to press F12 until the monitor flickers.
07. The 'Boot Device Menu' box appears. There are a number of options. Click '**Onboard or USB CD-ROM Drive**' to highlight it, then click '**Enter**' on the keyboard.
08. The 'Redo Backup & Recovery' screen appears. There are four choices. The first is 'Start Redo Backup', 'Safe Mode', 'Check CD for Defects', and 'Memory Test'. Click '**Start Redo Backup**' to highlight it, then click '**Enter**' on the Keyboard.
09. Within a few minutes or so the 'Welcome - Select an Option' screen appears. It says 'Easily create a backup image of your Computer, or completely restore from one. Click an option to begin'. There are two options, 'Backup' and 'Restore'. Click '**Restore**'.
10. The Restore '**Step 1:** Select Source Drive' screen appears. It asks 'Where is the source drive?' There are two choices: 'Connected directly to my computer', and 'Shared over a network'. Click a **dot** beside the first choice, which in this case is the external 500GB HDD, where the image was previously stored (not installed).
11. In the narrow window in the same screen, the following appears: '**Drive 1: (465.76GB NTFS)**', which is the computer's 500GB 'C:Drive'. When the arrow at the end of the narrow window is clicked, the following also appears: '**Drive 3: (465.76GB NTFS)**', which is the 500GB external HDD. Select the second option, and then click '**Next**'.
12. The Restore '**Step 2:** Select Backup Image' screen appears. It says 'Click the box below to select the image file to restore from'. The box referred to is on the right side of the narrow window. Click once on the 'Box'.
13. The 'Select Backup Image' box appears. There are four tabs at the top, two of which are named 'mnt and 'backup'. There are four headings on the side of the box named 'Search', 'Recently Used', 'root', and 'File' System'. Navigate to the folder that contains the image, if it is not already in the large box. If any previous backups have been made, they will appear here also. **Double** click on the folder that contains the image we wish to restore from. In this case it is '**20160710**', (*which stands for the 10th July 2016, the date the image was created*). '20160710.backup' appears. Click '**Open**' at the bottom right of the 'Select Backup Image' box.
14. The 'Select Backup Image' box now disappears, and '**20160710.backup**' now appears in the narrow window. Click '**Next**'.
15. The 'Restore '**Step 3:** Select Destination Drive' screen appears. It says 'Select the destination drive you wish to overwrite and restore the selected image to'. '**Drive 1 (465.76GB): WDC WD5000AAKS-0 (465.76GB NTFS)**' appears in the narrow window, which is the computer's 500GB HDD. When we click the arrow attached to the narrow window, two other choices appear. They are: '**Drive 3 (465.76GB): 00AADS-00S9B0 (465.76GB NTFS)**', as well as '**Drive 19 (249.37MB): DRW-24D5MT**'. Select the first of the three, then click '**Next**'.
16. The 'Restoring from Backup' screen appears. A small box appears that asks 'Are you sure you want to restore the backup to **/dev/sda**? Doing so will permanently overwrite the data on this drive!' Click '**Yes**'.
17. A message says 'Restoring your system from the image you selected. This may take an hour or more depending on the speed of the computer and the amount of data'. '% Complete' appears in the narrow window. Beneath the narrow window it says 'Part 1 of 2 (x %)'. '(x = Elapsed)', e.g. time elapsed. Then it says '(x Remaining)'.
18. Restoring the image took 10m21s for Part 1, and 7m41s for Part 2. When finished, a message in the narrow window says '**100% Complete**'. A small box appeared which said 'Backup restored *(in this case)* in 18.4 minutes' (similar to the above). Click '**OK**'. A message shortly appears near the top-right which says 'Backup Restored Successfully'.

19. When the small box disappears, click '**Exit**' near the bottom right.
20. The current screen disappears, and is replaced by the blue 'Redo Backup & Recovery' screen. Wait a minute before clicking the  turnoff icon at the bottom right. This gives time for things to finalize.
21. A pop-up box appears. Click '**Shut Down - Power off the computer**'.
22. A message says 'Please remove the installation media and close the tray (if any) then press **ENTER**'. Once done, the computer turns off. Now turn off and remove the external HDD. When ready, restart the computer and see if all went well. There have been no problems to date.

Checking the results:
Before creating the image, I double-clicked the ‘Computer’ folder on the Desktop to open it, then right-clicked on the ‘File System’ folder, then clicked ‘Properties’ from the drop box. The results were as follows: 346,331 items (and 430 hidden) 27GB (some contents unreadable). After restoring the image I got: 346,312 items (and 430 hidden) 27GB (some contents unreadable). I consider this to be a perfect image restore.

Restoring the image to a computer’s 1TB (Terabyte) HDD: (another test)
As the computer in this case had a 500GB HDD, and as an image was created of that drive, then if that image is restored to a larger drive, in this case a 1TB (1000GB) HDD, then the following occurs: After the image is restored to the computer, only 500 GB is available for the Operating System and storage, even though the new HDD is 1TB in size. So where is the missing 500GB.

To find it, we double-clicked the 'Computer' folder on the Desktop, and an item appeared in that folder named '**ST1000DM003-1SB10C: 500 GB Volume**'. Your drive name will probably be different. This is the missing 500GB from the 1TB HDD. After double-clicking on that 500GB Volume, the missing free space appeared, as an unformatted partition.

Using GParted, that missing volume was formatted as 'ext4' for data storage. As it did not work for storage, it was then re-formatted as **ntfs**', which worked really well as a storage partition (do **not** install an operating system on that Volume). The fat-32 file system was not chosen, as the size of any single data file being stored cannot exceed 4GB in size. There has been no problems, as this ntfs partition is operating within Linux, and not beside it. Consequently, there are no conflicts between the operating system’s ext4 file system and the partition’s ntfs file system done this way.

Using the formatted ntfs partition: Whenever we restart the computer, this hidden partition will not re-appear until we double-click on 'Computer' (located on the Desktop), then double-click on the drive mentioned above (which is usually the second item inside the Computer folder). The previously formatted ntfs partition then opens, ready to store data into it when required. It’s shortcut also appears on the Desktop, and will remain there until we restart the computer.
Data can be installed either in a folder on the Linux Desktop, or in the ntfs partition mentioned above.

Can we save our data located either on the Desktop or in the partition, to an External HDD:
Yes, it can all be transferred to an external HDD, and can be read by Linux or Windows operating systems.

Is the ntfs partition readable on a Windows OS, if placed in a docker: If our linux computer fails and we wish to save the data stored in the hidden ntfs partition on the computer’s HDD, can we do so, by placing the same HDD in a docker connected to a Windows computer? The answer is **no**, as the hidden ntfs partition exists within an ext4 file system. We should all prepare for computer crashes by diligently saving our data to an external HDD.

OS's THAT MAY SUIT OLD LAPTOPS AND DESKTOPS:
As the four operating Systems listed below are based on Ubuntu, then some of the information in this document may be applicable to them as well. The systems listed below are light to run. To obtain more information, go to their Web Sites.

Linux Mint 18 Sarah **Xfce** LTS **32-bit**. Released 2nd August 2016, and current till 2021.
Ubuntu Mate 16.04 LTS **i386**. Released in 2016.
Lubuntu 16.04 **i386** LTS. Released in 2016.
Xubuntu 16.04 **i386** LTS. Released in 2016.

USING A LIVE CD FOR SAFER BROWSING. First download the free ISO of our choice (more on that below), then burn it to a CD, using, e.g. Xfburn. The resulting CD contains a tiny operating system to boot from, but we will be booting into RAM, and not the computer's operating system. Before turning on the computer, connect the internet cable, and if we have data that we will need on a USB stick, plug it in also. Now that is done, start the computer, insert the Live CD, then turn off the computer (or, while the computer is turned off, push a straightened paper-clip into the tiny hole on the front of the DVD Player to open it to insert the CD).

To begin, push the computer's start button, press **F12** quickly and often until a boot choice appears, choose 'CD', and the computer will then boot into RAM. We can now search the Web safely. This has a variety of uses, some of which are online purchases, checking the Bank account, transferring between accounts, paying bills, etc. Navigating in RAM will leave no traces on the computer as long as we do not click 'Save', and no traces will be detected while using it. This is because the computer's own operating system is not active while running in RAM. This leaves no easy way for others to capture our keystrokes, etc., to steal our data and Passwords.

There are a few choices of **ISO**'s. **Slacko Puppy 6.3.0 32-bit** (released 16.11.2015) and **Slacko Puppy 6.3.2 eufi 32-bit** (released 23.06.2016) are my choices (there are 64-bit versions available also). The above choices can be run on computers that have a Hard Drive, **or** that have **no** Hard Drive. If the HDD was removed from a p/c for some reason, e.g. it may have been faulty, but as long as the RAM etc is OK, then the computer may still be able to to run on the stick of RAM inside it. We tested this by first unplugging the Hard Drive on our Desktop P/C, and found we could still boot-up into its' RAM and surf the net, using the above Slacko Puppy live ISO CD's inserted in the p/c's drive. It works the same with or without the internal Hard Drive connected, though some of the other Puppy ISO's require a Hard Drive connected. (PC means 'Personal Computer', but as few p/c's are free of spyware, then they are no longer personal, but are instead shared. They could then be called SP, or Shared Computers). When we run a computer in RAM, it is no longer shared.

The above ISO's can be downloaded free on the Internet, which can then be burnt to CD's as Active ISO's. Before proceeding, read the data and advice relating to it.

We should check the SHA256 of the downloaded ISO's, as well as the minimun system requirements to run them as listed below. To check the downloaded ISO's for accuracy, copy them to either the Desktop or the Home folder, right-click on them, and then click on 'Check SHA256' from the drop-box. Shortly a small 'Information' box appears, which contains the the SHA256. It is a mixture of 64-letters and numbers.

The minimum recommended system requirements for the 32-bit ISO is as follows:
slacko-6.3.0.iso: (e.g. 32-bit). 900MHz, (P3 or AMD K7), 512MB RAM. Slacko (32 bit) may run on a P3 733MHz processor with 256MB RAM, but does not support old P2 or AMD K6 processors.

The minimum recommended system requirements for the 64-bit ISO is as follows:
slacko64-6.3.0.iso: 1.6GHz, (IA64 or amd64), 1GB RAM.

The minimum recommended system requirements for the 32-bit ISO is as follows:
slacko-6.3.2-uefi.iso: (e.g. 32-bit). 900MHz, (P3 or AMD K7), 512MB RAM.

The minimum recommended system requirements for the 64-bit ISO is as follows:
slacko64-6.3.2-uefi.iso: 1.6GHz, (IA64 or amd64), 1GB RAM.